Manitoba

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Manitoba Health Services Commission

Laboratory and X-Ray Services

April 1, 1988 — March 31, 1989

ANNUAL REPORT - 1988 - 1989

LABORATORY AND X-RAY SERVICES DIVISION

MANITOBA HEALTH SERVICES COMMISSION

WINNIPEG, MANITOBA

EDITOR: ADRIAN N.C. DELAAT, A.R.T.

AUGUST 1989

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REPORT FROM THE DIRECTOR

The past year has continued to see many changes in the delivery of diagnostic services for the provision of health care. We in the Division trust that our efforts have been useful in serving Manitobans in diagnostic activities throughout rural Manitoba, and in the provision of reference and specialized diagnostic and public health activities at the Cadham Provincial Laboratory.

It is our fundamental belief that our primary responsibility is to the patients and those who use our services. We intend to have a rapid response to our users, and have therefore planned an improved electronic messaging system throughout the Province. This electronic communications system will integrate with those of Westman Laboratories and the northern nursing stations. Funds have been approved and plans organized for this system to come on stream early in the 1989 fiscal year. This improved system however does not replace personal communciations. If any of our users have suggestions for improvements, we wish to hear from them directly about how we may respond to their needs. To further invite feedback, we will enclose a questionnaire on our performance with the new Edition of the CPL Guide to Services which will be circulated soon.

We have aimed to increase our productivity through increased automation and implementation of new and more rapid technology. Evaluation of technology is an activity which consumes an increasing proportion of our time. Research and technology assessments done today will assist us with the technology and services that we will provide in the future.

The topic of utilization of diagnostic services throughout the health care system is another area we have addressed over this past year. Through a research grant we have reviewed the utilization and costs of health care diagnostic activities throughout the Province and in Canada. This information will be valuable in planning for the future.

Lastly, I wish to express my thanks to the many men and women in our Division who provide the direct diagnostic services to our users. We would not have the high quality of services that we believe are available throughout the Province serviced by our Division without the dedicated efforts of our over 300 staff. Your continued enthusiasm is essential as we strive for improvements in our future.

LABORATORY AND X-RAY SERVICES DIVISION

SENIOR STAFF LISTING

DIVISION DIRECTOR: G.W. Hammond, M.D., FRCP(C) (Int. Med., Med. Micro., Inf.Diseases)

LABORATORY PHYSICIANS:

J.G. Fox, M.D., FRCP(C) (Path.), Dip. Bact. (Tor),
L. Sekla, M.B., B.Ch., DTM&H, D.M., Ph.D.,
T. Williams, M.B., B.Ch., DPH, FRCP(C) (Ped & Med. Micro)

MANAGER, RURAL UNITS: M.W. Burroughs, FCAMRT, A.C.(R), R.C.T.

ADMINISTRATIVE OFFICER, CPL: J.M. Matthews

SCIENTISTS, CPL

G. Ahluwalia, B.Sc.,
M. Dawood, Ph.D.
D.E. Gelskey, M.S., MPH, Dr. PH,
A.C. Maniar, M.Sc., Ph.D., D.Sc.,
P. McNicol, B.Sc., Ph.D.,
D. Milley, B.Sc., R.T.
W. Stackiw, B.Sc.,
R. Thompson, B.Sc., R.T.

REGIONAL SUPERVISORS, RURAL UNITS

EASTERN MANITOBA: X-RAY - L. Wilson, R.T., R.C.T.
LABORATORY - Wm. Strukoff, DHA, R.T.

WESTERN MANITOBA: X-RAY - E. Carroll, R.T., R.C.T.
LABORATORY - W. Yaschyshyn, R.T.

NURSE EPIDEMIOLOGIST: D. Phippen, Reg.N., B.A., C.I.C.

DIVISION SPECIALIST TECHNOLOGIST: S. Giercke, A.R.T.

EDUCATION OFFICERS

X-RAY - J.D. Brownlee, B.Sc., R.T.
LABORATORY - A.N.C. Delaat, A.R.T.

DIVISION ACCOUNTING CLERK: C. McComber

CONSULTANTS:

Chemistry - P. Desjardins, Ph.D.
- L. Seargeant, Ph.D

Radiology - D. W. MacEwan, M.D., F.R.C.P., F.A.C.R.

PERSONNEL REPORT

During this fiscal year, the Division welcomed new staff:

Doreen Brugghe	- Treherne Lab & X-Ray Unit
Barbara Knapp	- Administrative Services, CPL
Wendy Bossuyt	- Clinical Microbiology, CPL
Marie McConnell	- Hamiota Lab & X-Ray Unit
Cheryl Peters	- Morden Lab & X-Ray Unit
Tracy Peters	- Serology, CPL
Irma Reckseidler	- Altona Lab & X-Ray Unit
Evelyn Stilwell	- Neepawa Lab & X-Ray Unit
Susan Normand	- Metabolic Diseases, CPL
Mary Anne Clarkson	- Winnipegosis Lab & X-Ray Unit
Anita Wiecek	- Technical Support Services, CPL
Barrie Troop	- Gladstone Lab & X-Ray Unit
Michelle Zubrecki	- Dauphin Lab & X-Ray Unit
Dean Norrie	- Administrative Services, CPL

Retirements

- Nil -

Resignations

Donna Coulson	- Hamiota Lab & X-Ray Unit
Sandra Dyck	- Altona Lab & X-Ray Unit
Mary Esau	- Serology, CPL
Cornelius Petkau	- Morden Lab & X-Ray Unit
Monique Smith	- Eriksdale Lab & X-Ray Unit
Michelle Marginet	- Metabolic Diseases, CPL
Irene Strembecki	- Selkirk Lab & X-Ray Unit
Tracy Magil	- Shoal Lake Lab & X-Ray Unit
Marisa Peters	- Technical Support Section, CPL
Judy Race	- Dauphin Lab & X-Ray Unit
Mary Anne Clarkson	- Winnipegosis Lab & X-Ray Unit
Donna Lincoln	- Serology, CPL (Deceased)

Transferred out of the Laboratory and X-Ray Services Division

- Nil -

Promotions

Lee Steski	- MG2, Russell Lab & X-Ray Unit, July 18th, 1988
Heather Mawhinney	- MG2, Virology, CPL April 5th, 1988
Brian Pitts	- MG3, Winnipegosis Lab & X-Ray Unit July 30th, 1988
Cyril Giroux	- MG2, Treherne Lab & X-Ray Unit June 1st, 1988
Dean Sigurdson	- CL3, Administrative Services, CPL October 22nd, 1988
Mary Anne Clarkson	- LA2, Winnipegosis Lab & X-Ray Unit November 19th, 1988

EXTERNAL COMMITTEE ACTIVITIES OF STAFF - 1988/1989

Mr. L. Baker	- Past-President - Manitoba Society of Medical Laboratory Technologists
Mrs. P. Bird	- Treasurer - Manitoba Society of Medical Laboratory Technologists
Mr. J. D. Brownlee	- Parliamentarian - Manitoba Association of Medical Radiological Technologists
	- Secretary - Faculty Liaison Committee
Mr. M. W. Burroughs	- Member - Medical Radiological Technology Advisory Committee, Red River Community College
	- Secretary - Provincial Ultrasound Advisory Committee
	- Member - Advisory Committee - Low Osmolar Contrast Media
Mr. A. N. C. Delaat	- Continuing Education Director - Manitoba Society of Medical Laboratory Technologists
	- Member - Advisory Council - Medical Laboratory Technology Program - Red River Community College
	- Member - Rural Hospital Steering Committee on Computer Information Systems
	- Member - Health Component Executive - MGEA
	- Member - Advisory Committee - Medical Laboratory Sciences Certificate Program - University of Manitoba
Dr. J. Fox	- Chairman - Perinatal Screening Committee
	- Member - Alpha Feto Protein Consultant's Group
	- Member - Biohazard Committee
	- Member - Manitoba Advisory Committee on Infectious Diseases (MACID)
Dr. D. Gelskey	- Chairman - Education Committee, Manitoba Heart and Stroke Foundation
	- Member - Grant Screening Committee, Manitoba Cancer Society

Dr. D. Gelskey (cont'd)	- Member - Manitoba Hypertension Coalition Steering Committee
	- Member - Undergraduate of Medical Education Committee, University of Manitoba
	- Member - Working Committee for World Health Organization Collaborating Center, University of Manitoba
	- Chairman - Hypertension Action Plan Working Committee
Mrs. S. Giercke	- Membership Director, Manitoba Society of Medical Laboratory Technologists
Ms. T. Greenlay	- Director - Manitoba Association of Cardiology Technologist
Dr. G. W. Hammond	- Member - National Advisory Committee on Immunization
	- Member - Technical Advisory Committee to Laboratory Centre for Disease Control, Ottawa
	- Member - Specialty Committee in Medical Microbiology, Royal College of Physicians and Surgeons of Canada
	- Member - Manitoba Advisory Committee on Infectious Diseases
	- Member - Awards Assessment Committee, Manitoba Medical Services Foundation Inc.
	- Member - Ad Hoc Committee on HIV Seroprevalence Surveys, sponsored by the Federal Centre for AIDS, Ottawa
	- Member - Executive Council, Canadian Infectious Disease Society
Dr. P. McNicol	- Papillomavirus Workshop Advisory Committee, Advisory to Canadian Government and National Funding Agency
Mrs. S. Normand	- Member - Advisory Council, Medical Laboratory Technology Program - Red River Community College
Ms. D. Phippen	- Steering Committee for Infection Control Guidelines. Bureau of Communicable Disease Epidemiology, Laboratory Centre for Disease Control, Health and Welfare Canada

Ms. D. Phippen (cont'd)	- Member - Manitoba Advisory Committee on Infection Control - Infection Control Subcommittee
	- Community and Hospital Infection Control Association (C.H.I.C.A.) - Manitoba
	- St. Amant Centre - Infection Control Committee
Dr. L. Sekla	- Preventive, Environmental & Occupational Health, Manitoba Medical Association
	- Senior Health Official, Environmental Health Protection, Health and Welfare Canada
	- Member - Manitoba Advisory Committee on Infectious Diseases
Mr. W. Stackiw	- Animal Care Committee, University of Manitoba
Mrs. E. Stockl	- Member - Maternal Serum AFP Advisory Group, and Working Committee
Mr. Wm. Strukoff	- Director - Canadian Society of Laboratory Technologists
Mr. R. Thompson	- Member - Maternal Serum AFP Advisory Group
Dr. T. Williams	- Member - Manitoba Advisory Committee on Infectious Diseases
	- Member - Program Review Committee, CP&S
	- Member - Standing Committee on Medical Manpower - MHSC

ADMINISTRATIVE SERVICES SECTION

The Administrative Services Section provides support services to the CPL, the rural Lab and X-Ray Units and the various health facilities and practitioners throughout the province. The section includes accounting, building management, clerical, data entry, shipping, receiving/mail, stores and purchasing.

A monitoring system to record and report on data entry errors has proven effective. Efforts to transfer the responsibility of entering laboratory results from the clerical staff to the laboratory staff were unsuccessful because of an inability to acquire sufficient mainframe terminals for the laboratory staff. Continuing efforts to transfer this particular portion of data entry will be made. The monitoring system in data entry enables the supervisor to record and follow up on all entries made by her staff. This is an on-going activity which is also monitored by the laboratory's Quality Control Committee.

A considerable amount of time was spent during the year in working with the Serology laboratory and the mainframe programmer in preparation for computerizing the remainder of the Serology and Parasitology laboratory. At present, only one portion of the Rubella program is computerized and it is tied into the automated Syphilis program. Once this laboratory is fully automated, the plethora of forms and the massive, time-consuming filing system will be redundant.

The electronic delivery of laboratory reports has grown considerably. All health facilities that have received hardware and an Envoy 100 electronic mailbox, now receive their Chemistry reports electronically. The format, prepared by MTS for our particular needs, was very well received by those on our system. The delivery from the mainframe to our remote terminals was successful in reducing turn-around times, but increased the workload of clerical staff at the CPL. Difficulties were experienced in the field in attempting to obtain re-transmissions, and the hardware we were using was not adequate to handle the large volumes of data being delivered to them. Plans were finalized to transfer this direct delivery system to the Envoy 100 electronic mail system, using the INET 2000 program. This transfer is to be effective April 1, 1989.

The Division is fortunate to have received approval to purchase 75 Unisys Personal Computers to replace the existing hardware throughout the province. These 75 Personal Computers will be installed starting the first week of April 1989.

The CPL inventory is delayed this year to accommodate the transfer from the manual system to the computerized system. No report on the inventory status is available at the time of this writing.

CLINICAL MICROBIOLOGY

Automation in the Clinical Microbiology section has enhanced the ability to cope with the large numbers of specimens processed yearly. A Bactec instrument was recently acquired to allow for more rapid detection of Mycobacteria.

This year there was a small outbreak of methicillin-resistant staphylococcal infections in the Province. This was investigated in detail in cooperation with Dr. L. Poffenroth of the Department of Health. Plasmid analysis of these organisms was performed at Cadham, phage typing at L.C.D.C. in Ottawa, and further studies in cooperation with Dr. D. Low in Ontario. A second small outbreak is still under investigation.

An increase in the number of cases of hemorrhagic colitis caused by E. coli 0157 H7 was noted for the year. This episode was investigated with the cooperation of Drs. L. Poffenroth and A. Roberts. Vero Toxin testing and partial typing was performed at Cadham, while Flagellar-typing was performed at L.C.D.C.

Various new commercially-available tests were evaluated for accuracy and ease of use. This included several tests for Chlamydia and for detection of beta-hemolytic group A Streptococci. Evaluation of the former was carried out in cooperation with Dr. R. C. Brunham and Dr. B. Binns of the University of Manitoba and the Health Sciences Centre.

The study of the mutagenic capacity of excreted chemotherapeutic anti-cancer agents has been completed. This was facilitated in cooperation with Dr. N. Kobrinsky. Full details of this research will be presented in the fall of 1989.

Toxigenic C. diphtheria are still present in the Province but usually are isolated only from specimens originating in skin or ear. Thus no clinical diphtheria was diagnosed this year.

See also Tables 4-1 to 4-6.

ENVIRONMENTAL MICROBIOLOGY

This Section tests samples of water, wastewater, food and air to detect microbiological contamination.

1. **Water analysis: Bacteria**

a. A total of 558 water samples were tested for Pseudomonas aeruginosa and 88 (15.7%) were positive. Forty-two samples were serotyped. For the third consecutive year, serotype 6 was the most common isolate. Serotype 14 was isolated for the first time from a water sample which also had a P. aeruginosa serotype 10. The serotypes isolated during each of the last 5 years are listed below

Serotype	1984	1985	1986	1987	1988
1	0	1	2	1	4
2	2	0	1	0	0
3	0	0	0	4	3
4	2	12	8	2	2
5	2	0	0	4	0
6	0	6	17	11	16
7	0	0	1	0	0
8	0	0	0	0	0
9	4	2	2	1	1
10	7	2	3	6	8
11	9	6	2	3	4
14	0	0	0	0	1
16	0	0	3	1	3
Untypeable	0	0	18	1	0

b. A total of 51 samples of water/wastewater were tested for Salmonella sp. but all were negative.

c. Forty-eight samples (mainly of well water) were tested for iron bacteria and 25 (56%) were positive.

d. Yersinia enterocolitica was isolated from a toilet tank with a recurrent problem of film production.

e. A total of 24 samples of water were examined for the presence of Legionella and 12 were identified as L. pneumophila group 1, all from the hot water supply of a Winnipeg hospital.

2. **Water Analysis: Fungi**

Ten requests for fungal counts in humidifier water in a government building. Only 2 had counts of 44,000 and 49,000 C.F.U./100 mL. There was also one request to identify mold from a ceiling in a home. Only common contaminants were identified.

3. **Water Analysis: Giardia lamblia and Cryptosporidium sp.**

Eight samples (4 surface water and 4 wells) were tested for Giardia lamblia and 4 surface water samples were tested for Cryptosporidium sp.; all were negative.

4. **Water Analysis: Media evaluation**

Three media were evaluated.

a. Baird-Parker medium was found to perform slightly better than the recommended procedures for isolation of S. aureus from water, namely TPEY and m-Staph broth.

b. mPA-b MEDIA (Dutka and Kwan, 1977) was 33% more efficient for the recovery of Pseudomonas aeruginosa from chlorinated water than the Asparagine broth MPN method in current use; however, it was equivalent to the MPN method for the recovery of P. aeruginosa in natural waters.

c. mTEC-Ig (Dufour, Strickland, and Cabelli, 1981). This is a one step procedure capable of identifying E. coli within 24 hours. In seeding experiments, recovery of E. coli exceeded 90%.

5. **Water Analysis: Special projects**

a. In collaboration with Agriculture Canada, the program of egg wash water monitoring was continued. Of 110 samples tested, 17 had unacceptable SPC of >100,000/mL.

b. In collaboration with Manitoba's Department of Environment, Workplace, Safety & Health the water supply of a small city in "Interlake" was monitored intensively. Thirty-two of 176 samples tested for Fecal Coliforms (18.1%) and 46 of 167 tested for Total Coliforms (27.5%) were positive.

6. **Food Analysis: Surveillance**

a. Surveillance of milk shake and soft ice cream machines.

i In collaboration with the city of Winnipeg Health Inspection Services the monitoring was continued. Of 1961 samples tested 427 (21.7%) had unacceptably high bacterial counts (ie SPC >20,000 and/or >10 total coliforms per gram). Failure to meet acceptable bacterial standards on two consecutive occasions resulted in the closure of 57 ice cream freezer machines.

ii In collaboration with Mr. J. Hossack, Regional Supervisor of Public Health Inspections and a STEP student, 384 ice cream samples were obtained from the Brandon area; 250 (65.1%) were positive (ie SPC >20,000/gm and/or >10 Total Coliforms/gram).

b. Surveillance of food served on trains and planes.

In collaboration with Medical Services of Health & Welfare Canada, this monitoring was continued. Of 71 samples of food to be served on planes, 46 (64.7%) were positive (ie SPC >100,000/gm, and/or >100 TC/gm and/or (>0 E. coli/gm). Of 67 samples of food obtained from various suppliers to be served on trains, 33 were positive (49.2%) (ie SPC >100,000/gm, and/or >100 TC; and/or > 0 E. coli/gm).

7. **Food Analysis: Investigation of food outbreaks**

A total of 200 food samples were tested; 15 had unacceptable indicator bacterial counts. Pathogens were identified as follows:

a. Staphylococcus aureus was isolated from:

i A rice salad which had a SPC of 97,000/gm, TC of 1100/gm, E. coli of 43/gm and S. aureus of 275/gm.

ii A pizza which had a SPC of 114,000/gm and S. aureus >15,000/gm.

iii BBQ Pork which had a SPC of 2100 and 50 S. aureus per gram.

iv Chicken which had a SPC of 187,000/gm and TC >1100/gm, E. coli >1100/gm and S. aureus 250/gm.

b. Staphylococcus warneri was found in rice served in one of the Folklorama pavillions. S. warneri resembled S. aureus on Baird Parker medium. Counts of 1725 - >15,000/gm were detected.

8. **Food Poisoning**

A total of 18 stools and 2 vomitus samples, related to 12 different outbreaks, were tested, in an attempt to correlate clinical and food isolates. Three pathogens were isolated from 3 stools and in 2 of these incidents no food samples had been submitted. One S. aureus (negative for toxins A, B, C, D) was isolated from faeces, but not from the food sample; verotoxin was also detected in this faecal sample. Salmonella thompson and Campylobacter jejuni were detected in samples in the other 2 outbreaks with no food submission.

9. **Research and Development**

1. The development of a procedure for the concentration and detection of Cryptosporidium in water. Water samples are concentrated by filtration and density gradient centrifugation. The use of detergents produces clean concentrates suitable for immunofluorescence. A polyclonal antibody raised in rabbits is used for screening and a commercial murine monoclonal antibody for confirmation. This method can detect 10 oocysts/L, and has a specificity of close to 100% and will facilitate the investigation of waterborne Cryptosporidiosis. Several such outbreaks have been reported in N. America.

2. The procedure for detection of Giardia lamblia in water was improved by modifying the Sheather's flotation to facilitate the microscopic diagnosis. Giardia lamblia is the most common enteric protozoa in N. America and many of the infections are transmitted via water.

3. The monoclonal antibody typing of Legionella pneumophila serotype 1 identified similar patterns in the clinical and tap water isolates obtained from a hospital in Winnipeg.

4. The percentage of recovery of Legionella spp from water samples was increased by optimizing the broth enrichment procedure.

5. A rapid, sensitive and specific assay in use for the detection of Verotoxin-producing bacteria in clinical samples was applied to ground beef samples. No Verotoxin-producing E. coli were found, but several cytotoxin-producing Aeromonads and Pseudomonads were detected.

6. An ELISA, developed by the Health Protection Branch, was evaluated for the rapid detection of E. coli 0157 in foods. None was found in the samples tested.

7. Procedures for the detection of endotoxins in air were developed, to be used at the request of the City of Winnipeg to monitor the level of endotoxins in the 3 sewage treatment plants.

See also tables 5-1 to 5-5.

METABOLIC SCREENING

We screened 17,611 newborn blood specimens and 13,925 urine specimens (100% and 79.1% compliance respectively) including unsolicited duplicates. 1,723 follow-up specimens were received.

We requested 284 bloods and 212 urines for investigation of possible metabolic abnormalities and referred 69 patients to the metabolic consultants for follow-up. In addition 129 bloods and 764 urines were requested due to inadequate specimen collection (e.g. insufficient quantity, contamination, etc.).

The following cases of metabolic disorders were detected:

HYPERPHENYLALANINEMIA (3)

F.S. - (f) - DOB: 4/4/89
G.E. - (m) - DOB: 4/25/89
H.J. - (f) - DOB: 5/1/89

GALACTOSE VARIANTS (3)

B.C. - (f) - DOB: 3/8/88 - D/G
D.J. - (f) - DOB: 25/10/88 - D/G
B.A. - (f) - DOB: 7/6/88 - D/G

HISTIDINEMIA (1)

G.M. - (F) - DOB; 10/31/88

HYPOTHYROIDISM PRIMARY (8)

A.C. - (m) - DOB: 4/24/88
K.L. - (f) - DOB: 8/18/88
W.T. - (f) - DOB: 8/16/88
C.R. - (f) - DOB: 9/16/88
B.B. - (f) - DOB: 10/14/88
L.J. - (m) - DOB: 11/1/88
E.L. - (f) - DOB: 12/31/88
L.D. - (m) - DOB: 8/28/88

HYPOTHYROIDISM SECONDARD (1)

S.L. - (f) - DOB: 6/27/88

CYSTINURIA (3)

B.N. - (f) - DOB: 9/3/87 - confirmed 10/88
L.M. - (f) - DOB: 9/25/85 - confirmed 10/88
H.B. - (f) - DOB: 8/86 - confirmed 1/89

CONGENITAL ADRENAL HYPERPLASIA (1)

M.R. - (f) - DOB: 10/13/88 - variant? - not confirmed

Modified galactose and phenylalanine methods are in the process of being implemented. They hold promise of much improved low range sensitivity and more accurate quantitation. The adaptation of the existing methods for phenylalanine and galactose testing consists of a combined elution step and the use of a more sensitive, semi-automated fluorometer.

We started screening for Congenital Adrenal Hyperplasia on July 18, 1989 and 7,982 newborn blood specimens were screened to the end of the year.

Maternal Serum Alphafetoprotein Screening

Currently the Abbott IMX system is being evaluated in order to ascertain whether sensitivity, turn-around time, precision and cost can be improved upon.

We processed 12,964 patient samples including requested follow up samples and internal repeats. In addition, 2,345 standards and controls were tested for a total of 15,309 AFP tests.

1988/89	First Screening	Follow up Specimens	Internal Repeats	Quality Control & Standards	Total
AFP tests	9,286	1,281	2,397*	2,345	15,309

*Internal repeats are the previously tested specimens on any of the follow-up samples. These are always run in conjunction with the latest samples to practice drift control.

Chemistry

In our chemistry section, we processed 34,434 tests last year. Due to an increased demand for lipid status testing and our aging, limited scope equipment, we obtained a new Abbott Spectrum chemistry analyzer. Preliminary results indicate that with it we will be able to fulfill our goals for lipid testing to reduce method biases to less than 5% and greatly improve the precision as well. (i.e. <3%)

See also tables 6-1 and 6-2.

SEROLOGY/PARASITOLOGY

In the Serology section, specific antibodies or antigens are detected in blood samples submitted for the serodiagnosis of infections or autoimmune diseases and for the assessment of the immune status of an individual.

In the Parasitology section, parasites are identified in faeces, urine, blood or tissues.

AIDS

As in the previous year, this section provided a province-wide service for the serodiagnosis of human immunodeficiency virus (HIV). Protocol for testing consists of two steps; first, screening using two ELISA obtained from two different manufacturers and second, IFA, to confirm all borderline and positive ELISA results. From April to February 1989, Abbot and Genetic System ELISA kits were used. In February, Genetic System was replaced by Organon-Technika ELISA. Western Blotting (WB), Antigen detection and Recombinant ELISA are performed on selected/problem cases.

During this fiscal year, a total of 3117 diagnostic sera were tested for anti HIV and 59 were positive. Table I details the number of sera tested and the number of positives for each of the risk factors. Table II summarizes the results of tests for anti HIV since the beginning of the program in December 1985.

The Section was also involved in STAT testing of all organ donors, participated in a number of serosurveys, quality control programs and evaluations of commercial kits.

Prenatal Screening for HBsAg

This program identifies pregnant women positive for HBsAg in order to offer their newborns prophylactic measures against Hepatitis B, ie HBIG and Heptavax. Early protection may prevent the development of hepatocellular carcinoma and liver cirrhosis later on in life.

From April 1, 1988 till the end of March 1989 a total of 21,900 sera were tested and 54 (0.24%) were positive for HBsAg. Of the 54 positives, 28 were previously known to be carriers and 22 were newly identified.

Serological Testing for Lyme Disease

An increase in the number of requests for the serodiagnosis of Lyme Diseases (LD) led to the establishment, in the CPL, of IFA and ELISA procedures. The IFA antigen was kindly provided by Mr. Max Garvie, LCDC. In addition, commercial kits were purchased from Hillcrest Laboratories. Tests have identified the presence of LD in Manitoba, a fact that was not known previously. A serosurvey was conducted in the fall of 1988; specific Borrelia antibodies were detected in 22.5% of the 320 sera tested.

Other Interesting Findings

1. Yersinia enterocolitica serotype 3 was diagnosed serologically in: a) an 11 year old boy suspected of having Crohn's disease. b) in a 35 year old woman with septic arthritis following an attack of diarrhea. Tests were done at the National Reference Center.

Table I, Diagnostic Anti HIV - 1988-89.

Risk Factor	Number of positive sera/ Number of sera tested
Homosexuals/Bisexuals	39/566
Intra Venous Drug Users (IVDA)	3/261
Homosexuals/Bisexuals/IVDA	6/34
Haemophiliacs	1/49
Global Endemic Exposure	3/44
Others	7/2163
TOTAL	59/3117 (1.9%)

Table II, Diagnostic Anti HIV - December 1985 - March 31, 1989.

	Risk Category No. Positive/No. Tested (% positive)						
YEAR	HOMOSEXUALS BISEXUALS	INTRA VENOUS DRUG USERS (IVDA)	HOMOSEXUALS BISEXUALS IDVA	HAEMOPHILIACS	GLOBAL ENDEMIC	OTHERS	TOTAL
December 1985	1/11	0/2	0/2	0/0	NA	0/9	1/24 (4.1%)
1986	61/451	0/51	2/12	6/12	NA	2/255	71/781 (9%)
1987	40/648	0/237	4/26	4/48	3/27	7/2088	58/3074 (1.8%)
1988	36/517	3/282	5/32	1/47	2/51	7/2289	54/3218 (1.6%)
Jan-Feb-March 1989	9/158	0/67	1/10	0/11	2/7	2/568	14/821 (1.7%)
TOTAL	147/1785 (8.2%)	3/639 (0.4%)	12/82 (14.6%)	11/118 (9.3%)	7/85	18/5209	198/7918
TOTAL	147/1785 (8.2%)	3/639 (0.4%)	12/82 (14.6%)	11/118 (9.3%)	7/85 (8.2%)	18/5209 (0.3%)	198/7918 (2.5%)

2. Respiratory Syncytial Virus (RSV) causing a hoarse cough and yellow sputum production in 4 residents of an Personal Care Home in Dauphin, was diagnosed by demonstrating significant changes in specific antibody titres.

3. IgM to Cytomegalovirus (CMV) were detected in 5 adults:

   a. A 22 year old male rejecting a transplanted kidney.
   b. A 65 year old dialysis female patient who developed pneumonia.
   c. A 29 year old female with fever and jaundice.
   d. A 43 year old man with lymphadenopathy, hepatosplenomegaly, fever and weight loss.
   e. A 57 year old female with fever, myalgia and jaundice.

4. A significant increase in specific antibody titres to Chlamydia spp were detected in 2 patients with pneumonia: a) one a 20 year old male, and b) a 45 year old male with atypical pneumonia.

5. Seroconversions to Coxsackie B were detected in 9 persons:

   a. A 55 year old female with Hepatitis.
   b. A 29 year old male with an encephalitis (from Winnipeg).
   c. A 35 year old male, from Killarney, also with an encephalitis.
   d. A 6 year old male, from Winnipeg, with an aseptic meningitis.
   e. A 5 year old leukaemic patient with respiratory illness.
   f. An 18 year old male with pericarditis.
   g. An 11 year old male with maculo papular rash.
   h. A 39 year old male with stiff neck, headache and paraesthesia.
   i. A 34 year old female with acute pericarditis.

6. A case of Coccidiodomycosis was confirmed by the National Reference Center in a 42 year old man with hemoptysis and a cavity in the right upper lobe of the lung and a history of residence in Arizona.

7. Two cases of Aspergillosis were confirmed by the National Reference Center. One, a 71 year old man with a chest lesion and the other a 57 year old female with fever and elevated liver function tests and a flu-like illness.

8. One case of Blastomycosis was diagosed in a 37 year old male with arthritis.

9. A case of Toxocara was diagnosed by the National Reference for Parasitology in a 4 year old boy with respiratory wheeze and high IgE levels.

10. A case of Tularaemia was detected; a 2 year old male with cervical lymphadenopathy.

11. A study of Arctic Trichinosis was continued. Serological tests done at the National Reference Center for Parasitology revealed that 33 of 110 persons were positive (30%). Significant changes in antibody titres were detected in 3 of the 33.

Research and Development

Studies initiated by CPL

1. TWAR Study

Recently a novel chlamydia agent designated TWAR has been shown to be an important respiratory pathogen. It has been isolated from individuals with an acute respiratory disease including pneumonia, bronchitis and pharyngitis. It is often characterized by a prolonged cough of up to 4 weeks.

The micro-immunofluorescent test using TWAR elementary bodies as antigen is a reliable method for the measurement of species specific antibodies to this chlamydia infection. 127 patients with lower respiratory tract infection on whom acute/convalescent sera were submitted to the CPL were tested for TWAR. Results showed that 95 (74.8%) had antibody titers of less than 1 in 64 (negative); 30 (23.6%) had levels ranging from 64 to 1024; 2 patients (1.6%) had a four-fold increase in titer. The incidence of 23.6% correlates well with the findings of other investigators.

2. Q Fever

Q fever is a disease caused by C. burnetii, a rickettsial agent. It can be an occupational disease especially in those handling and working with sheep for example in medical research. All sheep brought to the animal house are tested by a micro IFA test using C. burnetii organisms. During this last fiscal year a total of 115 sheep, 5 cows and 33 humans were tested for phase 1 and phase 2 antibody. The detection of high levels of antibody to phase 2 in 3 sheep, with evidence of a recent infections in one, precipitated the testing of all animal care and research staff; 2/29 tested had antibody levels at 1:32. These two individuals were negative 4 years ago. The protocols for handling of animals in the University animal house are presently under review.

3. Blastomycosis

An indirect enzyme immunoassay (ELISA) technique using a commercial Blastomyces dermatiditis, purified A antigen (Meridian Diagnostics) was developed to detect antibodies. Positive sera were obtained from clinical cases of blastomycosis which were culture positive and antibody positive by immunodiffusion.

4. Chronic Fatigue Syndrome (CFS)

Following reports that CFS was due to a recurrent infectious mononucleosis (IM) infection, we have received an unusual number of requests to test for this condition. Our protocol is to screen first for EBV-VCA IgM and if negative, test for IgG. If the IgG levels are greater than 1:320, then the other markers are tested for, ie antibody to the early antigen (EA) and nuclear antigen (EBNA).

A total of 312 sera with histories of CFS were tested. Laboratory results indicated that 7/312 (2.2%) were considered positive and fit the criteria for CFS; 211/312 (67.6%%) were considered old infections; 76/312 (24.4%) were recent-past infections; 8/312 (5.8%) were recent infections. Recent reports have shown that IM is not the cause of CFS. Routine testing has been discontinued. Test will still be conducted in special instances.

5. AIDS Testing

Recombigen HIV (EIA) (Cambridge Bio-Science Corp.)

The test is an indirect enzyme immunoassay for detection of antibody to HIV in human serum or plasma using genetically engineered gp 41 and gp 120 (env.) and p24 (gag) gene products of HIV expressed in E. coli coated onto polystyrene microwells.

Evaluation

CPL was requested by Ottawa to determine the effects of multiple prewarming of reagents on test performance, a situation likely to be encountered in a small laboratory setting. Reagents were prewarmed 6 times over a 17 day period and tested each time. Mean O.D. values on the Negative controls were: 1) .036; 2) .027; 3) .024; 4) .032; 5) .020; 6) .022. Mean O.D. values on the positive controls were: 1) 0.700; 2) 0.681; 3) 0.715; 4) 0.664; 5) 0.675; 6) 0.465. The O.D. values decreased after the 6th warming period. The calculated cut-off values were reduced from 0.37 (first test) to 0.182 (sixth test). This data would suggest that the kit (192 tests) can be used up to 5 times without affecting test results.

Sera tested consisted of 28 positives (EIA, IFA, WB), 52 negatives (EIA), 53 problem cases (conflicting EIA). Results showed agreement with other tests in 24/25 of the positives. In the one discrepancy the Western Blot showed protein bands at p51, p31, p24. There was complete agreement on the negative samples 52/52. On the problem cases, 49/50 were negative by Recombigen (confirmed by other tests - Western Blot, IFA, EIA). In the one positive Recombigen, the ELISA (Abbott and Ottawa) were negative while ELISA and Ortho, Dupont, Genetic System, Welcome were positive. IFA and Western Blot were also positive.

Studies in Collaboration with Others

1. Hepatitis B Viral DNA

The primary indicators of infectious Hepatitis B virus particles have been HBsAg and HBeAg. As these antigens can exist in a free form, the correlation with infectious particles is not absolute. However, the presence of DNA-containing viral particles in the serum are indicative of active viral replication. A radioisotope (^{125}I) molecular hybridization assay that detects and measures Hepatitis B

viral DNA in serum (ABBOTT) was used for a study conducted in conjunction with Dr. Minuk, a Hepatologist at HSC. 78 sera from 15 patients were tested for the presence of viral DNA using ABBOTT GENOSTICS Hepatitis B viral DNA tests. Performance of the test kit was deemed acceptable (communication by ABBOTT), even though the positive control mean counts ranged between 2000 - 3000, rather than the expected > 3000. The kits were used towards the end of the dating period and there may have been some decay of the radioactive isotope.

2. Measles

In collaboration with Dr. J. Embree 123 sera of infants from Kenya were tested for measles antibody by the ELISA test and quantitated by hemagglutination-inhibition method.

3. HIV-1

In collaboration with Dr. Long a total of 210 sera of Haitians with tuberculosis were tested for HIV antibody using 2 ELISA screen tests (Abbott, Organon-Teknika). Positives were confirmed by IFA (Institut Armand Frappier). There were 42/210 (20%) confirmed positives.

4. Western Equine Encephalitis (WEE)

A. Surveillance

In collaboration with the City of Winnipeg 10 sentinel chickens were placed in each of 5 locations, the Assiniboine Park Zoo, University of Manitoba, McPhillips sludge beds, Charleswood lagoon, and Transcona, from June - September. Chickens were pre-bled before exposure and every two weeks thereafter.

A total of 396 bloods were tested by the hemagglutination inhibition (HAI) procedure. WEE activity was minimal and detected at two locations only. There were a total of 7 seroconversions - 1 on the 19th of July, 2 on August 3 (McPhillips and Transcona), 2 on August 9 (both at McPhillips), 2 on August 23 (McPhillips).

B. Diagnostic

i Humans

70 sera from 55 patients with symptoms were tested by HI for WEE, St. Louis Encephalitis, California Encephalitis. None were positive.

ii Horses

A total of 34 bloods from 26 horses were tested by HI for WEE. 3/26 showed significant rises in antibody levels.

Parasitology

A Ph.D student continued her work on Cryptosporidium, studing the cellular response in animal models.

See also tables 7-1 to 7-11.

TECHNICAL SERVICES

Quality Control

The Quality Control section continues to provide a number of services to other sections at Cadham Provincial Laboratory and LAXUS units.

Performance testing of media and reagents prepared at CPL is continuing, as well as troubleshooting of any problems that are noted. Technologists in the Media Section are once again rotating through Q.C. as part of a job enrichment program.

Evaluations continue on all new lots of media, reagents, antimicrobial discs, urine dip slides, blood culture systems, API strips, pregnancy test kits, kits for testing for infectious mononucleosis and kits for rapid testing for Group A Streptococcus. These products are tested using various controls and are checked for appearance and growth characteristics as applicable. Some products are tested twice, initially and just before their expiration date. They may also be tested when problems are reported from the field.

Gibco Laboratories are now obtaining media from a plant in Paisley, Scotland. We did extensive testing of their new products and found them satisfactory for our purposes.

Numerous problems were encountered with commercially prepared Gram stain kits. After evaluating a number of different commercial products, we decided to prepare our own.

All "new and improved" products provided by sales representatives are tested in parallel to products in current use. Only when a new product proves to be superior in performance and comparable in price, do we change to a new product.

The Q.C. section is involved in a number of internal and external proficiency testing programs for CPL and LAXUS. External programs include several College of American Pathologists (CAP) programs such as Comprehensive Microbiology/Immunology, Virology, and Herpes/Chlamydia, and L.C.D.C. Microbiology survey.

Internal programs consist of sending "blind" specimens to Clinical Microbiology, Virus Isolation, Environmental Microbiology and Serology sections. These specimens are made from our collection of stock cultures, positive and negative serum controls, slides and specimens received from various sources. These specimens are treated as clinical specimens in that they are designed to "mimic" a patient with symptoms. In LAXUS, specimens are sent for microbiology culture and sensitivity, smears for Gram stain and interpretation, urine for pregnancy testing, specimens for rapid testing for Group A Streptococcus and sera for infectious mononucleosis testing.

The Q.C. section has recently updated and expanded its stock culture collection of bacteria, fungi and yeasts to more than 400 items. These were obtained from American Type Culture Collection (ATCC), CAP and

L.C.D.C. surveys and clinical isolates. These cultures are used in our proficiency programs, by other laboratories in Winnipeg, and by individuals requesting materials for research projects.

Media Section

While continuing to provide CPL, LAXUS and special agreement units with a large and varied supply of tubed and plated media, this section has expanded its preparation of reagents and media to include the following:

1. All Gram stains for LAXUS and special agreement units.

2. Loefflers Alkaline Methylene Blue stain - used in staining fungi.

3. AFB smear fixing solution - for processing an AFB smear from a positive Bactec 12B vial.

4. Oxacillin-NaCl agar - used for isolation and confirmation of methicillin resistant Staphylococcus aureus (MRSA).

5. Histidine-biotin agar - master plates for non R-factor strains of mutagenic Salmonella, tests for histidine requirement.

6. Fastidious anaerobic broth - tested as a substitute for cooked meat media, but did not meet our requirements.

The following media and solutions were prepared for Parasitology:

1. Schaudinns fixative

2. Non-nutrient agar and Page - amoeba saline — These two preparations are used for the isolation and culture of pathogenic free living amoeba.

3. Phthalate

4. Potassium phthalate

5. Saline agar slopes

6. 20% peptone water

Several of the working solutions for DNA probe research are now being prepared by the section, including:

1. Plasmid mini preparation solutions

2. 20 - SSC

3. Cervical Cell Solution

4. Alkaline Blotting Solution

5. Tris - acetate electrophoresis buffer

6. Tissue suspension buffer

Sterilization

Decontamination of biohazardous material is extremely important in view of the hazardous materials that are processed at CPL. Correct protocol and procedures are in place to ensure the safety of the employees at CPL and the surrounding environment.

VIRUS DETECTION SECTION

The highlights of the Virus Section are as follows:

1. Human immunodeficiency virus (HIV) activities.

   Dr. M. Dawood has been recruited as a Scientist in the Virus Section, with a major role of implementing diagnostic techniques for human retrovirus. Over the course of the past year, he has equipped and established HIV diagnostic methodology at the CPL. Techniques established include culture of virus, and ongoing projects to evaluate the polymerase chain reaction in the application of six different virus gene primers and probes.

2. Human Papillomavirus detection.

   Dr. P. McNicol has developed the polymerase chain reaction methodology for detection of human papillomaviruses. This technique supplements additional technical methods in ongoing studies of the significance of human papillomavirus infections in human disease.

3. Study of methods for an improved diagnosis of Norwalk-like virus causing a gastroenteritis outbreak. Collaborative studies (Dr. Roger Glass, Centers for Disease Control, Atlanta) are underway to evaluate improved detection of these virus infections.

4. Ongoing evaluation of cell lines.

   Several new cell lines have been evaluated, including A549 cells as a backup cell line for herpes virus work, fetal rabbit kidney as the main cell line for herpes simplex (vs primary rabbit kidney) and 293 cells for adenovirus detection. We also changed several media used for cell lines. We have compared MEM and L15 medium, and found the L15 superior in the maintenance of the pH of cell lines. We continue to have very excellent local cell lines, reagents and quality control.

5. A record number of RSV detections were made during 1988/89.

6. Detection of Rhinoviruses.

   We have now been able to detect and identify Rhinoviruses in a number of clinical samples.

7. Enhancement of CMV detection through routine and stat provision of the CMV shell vial technique.

8. Use of adenovirus latex agglutination assay is a rapid screen for the presence of adenovirus in cell culture.

9. Evaluation of ELISA procedures for detection of Herpes Simplex virus. These kits were not found to be cost-effective for materials and labour, vs. the current protocols.

10. An evaluation of the impact of influenza epidemics on morbidity in Manitoba, in association with Dr. Les Roos, Department of Community Health Sciences in Manitoba and Dr. David Fedson from Virginia. This is an ongoing collaborative study and shows a clear relationship between influenza epidemics (determined by influenza virus isolates) and hospitalization in Manitoba. A study of the impact of current influenza prevention programs is under way.

11. Improved diagnosis of enteric adenovirus infections. A graduate student, Mr. Tim Scott-Taylor, has been developing genetic probes for the detection of enteric adenoviruses. He has cloned most of the adenovirus 41 genome and is evaluating the ability of adenovirus 2 and 41 probes to detect adenovirus from clinical samples. In addition, an evaluation of commercially available adenovirus 40/41 ELISA test has shown an insensitivity to local isolates of adenovirus 41 which are variant strains.

See also table 8-1.

INFECTION CONTROL PROGRAMS

This program is provided to assist rural hospitals and long term care facilities in the establishment of infection control programs and in the training of infection control practitioners. Ongoing consultation and continuing education services are included.

One hundred and nine (109) facility visits were made during which fifty-six (56) continuing education sessions were provided. Attendance totalled 814. Various infection control or infectious disease topics were presented.

Telephone consultations addressed a host of questions and numbered 241.

Five (5) two-day training courses were provided for thirty-seven (37) hospital and sixteen (16) long care employees.

Mighty Microbes, an information bulletin continues to be popular. Long term care infection control practitioners received four (4) issues as did hospitals.

Miss Phippen remains active on the Health and Welfare Steering Committee on Infection Control Guidelines, the Working Group on the revision of Infection Control Guidelines, the St. Amant Centre Infection Control Committee, MACID-IC Subcommittee and CHICA-Manitoba.

RURAL LABORATORY AND X-RAY UNIT SYSTEM

The rural Laboratory and X-ray Services Unit System continued to provide diagnostic services in medical laboratory technology, radiology, diagnostic ultrasound, and electrocardiography, in 75 Manitoba health facilities. Tables 2 and 3 present overall workload statistics.

LABORATORY EASTERN REGION

Quality Control Programs:

The Division continues to monitor and ensure quality of laboratory analyses by participating in the following internal and external Quality Assurance Programs.

Those offered by the Quality Control Section of the Cadham Provincial Laboratory:

a. A Quality Control program for monitoring pregnancy testing and infectious mononucleosis testing.

b. Microbiology - a comprehensive Gram staining, sensitivity testing and culture identification Quality Control program for the participating Laboratory and X-ray Units.

External Quality Control programs participated in are:

a. Commercial Hematology control cells (internal program on all electronic cell counting apparatus).

b. The Regional Hematology Quality Control program which includes the dissemination of whole blood samples on a defined area basis and subsequent collation of area statistics.

c. Ames Urinalysis program.

d. The Fisher Diagnostics "Accutrak: computerized chemistry quality control program monitors the chemistry program.

e. All Units continue to participate in the College of American Pathologists Inter-laboratory Comparison program.

f. All Units involved with Blood Bank Procedures are monitored by the Quality Control protocol developed and administered by the Canadian Red Cross.

New Activities:

Once again, there has been a major revision of the Consumable Supplies Catalogue as it relates to our Divisional Central Warehouse and distribution system. Many slow moving and/or obsolete items have been deleted from the catalogue. Some new products have been added which reflect the changing technology in instrumentation.

A system has been developed toward a more streamlined approach for the procurement of certain consumable supplies which by-passes the Central Warehouse and places the consumer in direct communication with the supplier. This process reduces wastage of a number of time sensitive products.

The on-site program for therapeutic drug monitoring (theophylline estimation) at Selkirk, Portage, and Morden has been changed this year. The current test protocol utilizes the dry chemistry principle and the Ames Seralyzer.

The Division now provides on-site staffing of the Diagnostic Unit at St. Claude.

We have initiated a policy and procedure for off-site laboratory testing. This program offers a quality control process to any hospital for any process which is available to the hospital from our Laboratories. This quality control program monitors the off-site urine dip stick and glucose monitoring which are performed by hospital personnel on the hospital wards.

All Gram staining reagents, which were previously purchased from commercial sources are now being manufactured, assembled, and distributed by the Cadham Provincial Laboratory. This move has negated the problems of outdating of reagents and greatly improved the quality of the stains. The overall administration of the quality control process at a central location has been a main contributor to the improvement of the overall process.

Upgrading of Systems:

Coulter Electronics Model T540 hematology microcell counters have been installed at the Ste. Anne, Carman, Winkler, Pinawa, Stonewall, Arborg, and Treherne laboratories. This instrumentation has whole blood sampling capability and five simultaneous analyses are performed - hemoglobin, hematocrit, red cell count, white cell count and platelet counts.

The program of converting all of the laboratories to the use of safety centrifuges is almost complete. This year an additional ten placements were made.

Refrigerator/freezer functions were upgraded at Stonewall and Manitou.

A semi-automated chemistry analyzer - Kodak Ektachem DT60 System, has been installed at Stonewall, Ste. Anne, and Pine Falls. These systems have provided a quality clinical service for the smaller laboratory, offering a varied test menu with dry chemistry technology.

A microprocessor software upgrade was installed on the Cobas Mira chemistry Analyzers at Morden, Portage la Prairie and Selkirk, allowing for an upgrading of a number of technical functions.

A Nova ion selective electrolyte analyser was installed at the Selkirk laboratory. This system is also capable of analyzing serum lithium by the ion selective process.

The Morris laboratory received an auto-sampling device to streamline the performance of electrolytes of their Ciba Corning ion selective electrode analyzer.

A Clinitek 200 and hard copy ticket printer was installed at the Morden Laboratory. This allows for a semi-automated method for the performance of the chemical analysis portion of a urinalysis.

The St. Pierre laboratory received a Ciba Corning ion selective analyzer.

New microscopes were installed at Eriksdale and Steinbach.

An Electra MLA 750 coagulation timer was installed at the Selkirk laboratory. This unit operates on the photometric clot detection principle and is used in the performance of all routine coagulation tests.

Research and Development:

Following the evaluation of a variety of coagulation testing equipment, the Ortho Coagulab 16-S was chosen as the instrument of choice for the Steinbach laboratory.

The Carman laboratory evaluated three models of hematology microcell counters from three manufacturers. Their time and effort was very valuable for the Division in making a purchase decision. From this, seven Coulter Electronics Model T540 microcell counters were purchased and installed.

Chemistry reagents from Diagnostic Chemicals Ltd. were evaluated at Portage la Prairie and Morden on the Cobas Mira and at Gimli on the Electronucleonics Gemeni.

The Carman laboratory has evaluated the Sigma reticulocyte stain.

Serum specimen mailing tubes were evaluated at the Morden Laboratory.

Latex and vinyl gloves from various manufacturers were evaluated at the Selkirk and Portage laboratories.

The Ciba Corning blood gas controls have been evaluated at the Selkirk Laboratory.

The MLS 650 coagulation analyzer was evaluated at the Selkirk Laboratory.

Construction and/or Renovations:

Divisional staff were involved with Manitoba Health Services Commission Planning and Construction staff and various architectural groups over the past year.

Architectural drawings are completed for the Manitou Unit and construction/renovation is scheduled to begin.

Following the major fire at the Gillam Hospital, construction and renovations are currently underway. The laboratory was somewhat water-damaged, but the majority of equipment was salvaged.

Portage la Prairie, Stonewall, Beausejour, and St. Pierre continue to be at the functional program stage.

Feasibility studies and initial planning have been concluded at Notre Dame with regards to renovating an area of the hospital for an expanded on-site laboratory.

The Vita construction is currently at the architectural planning stage.

LABORATORY WESTERN REGION

The fiscal year 1988-89 was another active year for laboratories in the Western Region within Lab and X-ray Services, with the addition of new programs and enhancement of existing programs, instrument and procedural updates.

Approximately thirty technical staff attended the Brandon Post Graduate Course during October 1988, with an opportunity to review some of the latest instrumentation and learn of the latest advances in medical technology. Several staff also attended life skill courses in such areas or stress management and improved communication courses.

With continued concern for safety in the workplace, Workplace Hazardous Materials Information System was implemented throughout the Division. Staff attended internal and external seminars to acquaint themselves with the system. Basically, the system lays out in greater detail the constituents of a substance we may be working with at any given time, indicating the level of hazard when put to use for routine purposes. Data sheets were made available to all staff in each workplace at a central location which may be consulted when required.

New programs:

Blood Gas Analysis - Ste. Rose.

Enhancement of Existing Programs:

Improved software for Chemistry Analyzers at Flin Flon, The Pas, Swan River, Dauphin and Neepawa.

Semi-automated Hematology Analyzers for The Pas, Neepawa, Hamiota and Killarney.

Fully automated Chemistry Analyzer for Dauphin.

Semi-automated Urine Strip Readers for Flin Flon, The Pas, Dauphin, Neepawa, Minnedosa, Virden, Killarney, Roblin and Ste. Rose.

Semi-automated Chemistry Analyzers for Deloraine, Crystal City, Russell, Minnedosa and Gladstone.

New products and instrumentation were evaluated including Hematology analyzer and Coagulation analyzers.

Plans for 1989-90 include upgrading of pathological waste management and of existing instrumentation, introduction of Blood Gas analyzers to new locations and the addition of new test procedures e.g., Digoxin and serum HCG. Current methodologies for Urine Protein, Theophylline, and CK MB will be reviewed.

RADIOLOGY, ECG AND ULTRASOUND EASTERN REGION

Ongoing Programs:

A revised edition of the National Diagnostic Radiology Workload Measurement system was issued late in 1988. The Manitoba Health Services Commission also requested a detailed Monthly X-ray Summary. As a result, extensive revisions were made to the Daily and Monthly X-ray Summaries.

Revisions were also made to the Ultrasound Monthly Report to correspond with the Workload Measurement System.

The Divisional Policy and Procedures Manual has been reviewed, revised, and distributed to all Units.

Planning and Construction:

Functional programs have been established for new radiographic facilities at Vita, Beausejour, St. Pierre, Stonewall, and Portage.

Architectural plans are complete for the new Manitou Lab and X-ray Unit with construction expected to begin in the summer of 1989.

Capital Equipment Purchases:

As part of the Division's continuing program of replacing aging and obsolete radiographic equipment, the X-ray Departments at Emerson, Eriksdale and St. Claude received new radiographic equipment. Each department now has a Gendex radiographic unit featuring high frequency generators, floating top pedestal tables, wall bucky and automatic exposure control devices.

The Selkirk and Portage la Prairie ECG departments were recipients of the Burdick E600 interpretive ECG machines. This equipment will be used primarily for stress testing examinations. Morden and Steinbach ECG departments received the Marquette MAC PC interpretive ECG machines and Gillam, Gimli, and Morris now have the single channel Burdick Elite interpretive ECG machines. Existing machines are being relocated to other departments.

New Kodak M35 film processors were installed at Ste. Anne, Beausejour, Altona, Carman, Swan Lake, and Morris was supplied with an AFP 14XL/90 film processor, as part of the continuing program to upgrade darkroom equipment.

Product Evaluations:

Field trials were conducted on the Marquette MAC PC, Siemens Sicard 400, Burdick E600, ECG machines at the Selkirk ECG Department.

Ultrasound machines, including the A.T.L. Ultramark IV and Siemens Sonoline SL-1 and SX, were assessed at the Selkirk General Hospital.

Film and screen system tests were conducted at Winkler. Comparisons were made with four types of film and screens from four companies. Assessments were made using 400, 600 and 800 speed systems.

RADIOGRAPHY, ECG AND ULTRASOUND WESTERN REGION

Provincial Lab and X-ray Services continues to maintain high operational and service standards through continuance of such programs as X-ray and EKG Equipment Quality Control Testing, EKG electrical Safety and Maintenance checks, In-house processor maintenance procedures, processor component exchange program, expanded quality assurance procedures and extensive product and equipment evaluations.

Field trials have been carried out on everything from a PIE portable ultrasound unit in The Pas to EKG disposable electrodes in half a dozen different departments. As a result of these two field trials The Pas purchased a model 150 PIE scanner and the disposable electrodes were rejected because of their high cost. Other field trials were carried out and reported on by Mr. Ernie Kindrat of Swan River on a Konica model QX-60A low volume processor, the new DISC patient film identification printer by the Killarney staff, the Fuji RGII in Erickson by Mr. Garry Michaluk. Product comparison research was also carried out in different sites on X-ray film, computer interpretive electrocardiographs and contrast media. Mr. Brian Phillips and Mr. Geoff Chandler reported on a film comparison study they did in Killarney on the Konica MG, Fuji HR-B and FujiI RXO-G type films. Comparison studies were done on the Burdick Elite and Marquette MAC-PC by Mr. Dennis Preston in Russell, Mr. Don Wilson in Hamiota, and Mr. Henry Maryniuk in Souris. Product comparison reports were submitted by Mrs. Fran Preston from Virden and Mrs. Jackie Fraas from Dauphin on their evaluations of the EZ-EM Polibar and Lafayette HD85 contrast medias.

The reports on all of the above are on record for reference in our research and development file.

Purchase of the major equipment for the Yellowhead Mobile Ultrasound service culminated many months of planning and organizing. This mobile service will provide on-site general abdominal, obstetrical and gynecological examinations in the Neepawa, Minnedosa and Russell hospitals. The equipment mentioned is an ATL Ultramark IV with two sector scanners.

Several imaging methods will be utilized to try to establish the best combination for this mobile service. Video taping, digital disk imaging, thermal printing and multi-format camera filming will be evaluated. Recruitment of an ultrasound technologist is actively being pursued, and start-up of the new service is expected shortly. Our thanks go to Mr. Al Martin, administrator at Minnedosa Hospital, and Dr. Gary Brooker, radiologist, for their considerable help in the planning process for this service.

The first major purchase of the new technology computer interpretive electrocardiograph units was made. The western region received 3 of the 9 units ordered. Flin Flon Hospital received the newly developed Marquette MAC6 full-sized multi-channel unit. Ste. Rose and Souris received the compact Marquette MAC-PC. These purchases were complemented by equipment received through community donation funds. Russell and Hamiota now use Marquette MAC-PCs and Snow Lake a Burdick Elite model thanks to their community hospital donations.

The total Provincial Lab and X-Ray Services network and X-ray Departments converted over to the use of Kodak radiographic film and processing chemistries. This was done under a two-year contract signed with Kodak Canada and runs until March 1990.

A unit workload profile was developed by Mr. Dennis Preston. This profile summarizes the total volumes of work for all departments in Lab and X-ray Services including Lab, X-ray and EKG. It lists the number of effective full-time positions in each department and gives a breakdown of the Workload Measurement Systems unit values per EFT per year, work hour productivity per EFT, and a work hours productivity index. The calculations used are based on Stats Canada Diagnostic Radiology Workload Measurement Systems.

New Quality Assurance Audit Procedures for use in Radiography are being developed by Mr. Brian Phillips. They are intended as a general use method of auditing technical quality patient care, personnel practices and radiation protection procedures. These audit forms will augment quality assurance practices by technologists in conjunction with their individual hospitals.

Major capital purchases include a new condensor discharge type mobile radiographic unit for Virden, a small compact Fuji RGII film processor for Erickson, EKG machines mentioned previously, a Kodak M6AW processor and Shimandzu radiographic fluoroscopic suite for Flin Flon. The Shimandzu system will be new to the service and includes a 14 x 14 spot film device, 3 field image amplifier, a 90-30° tilt table, a 50KW single phase generator as standard equipment and also includes optional TV system and wall cassette carriage.

Construction Programs:

New hospital construction programs for Erickson, Virden, and Benito hospitals were completed this fiscal year.

Construction was started on the Erickson project in the fall of 1988 with expected completion to be August 1989. A Bennett integrated-table tubestand, general radiographic suite was included in the construction capital purchasing. The Bennett system includes a newly developed high frequency output generator. This provides a number of distinct advantages. The X-ray beam being produced is more efficient than a regular fully rectified single phase output generator. It allows extremely low and accurate timer control and higher tube output, as well as a reduced radiation dose rate to the patient. Another feature of this new generator is APR (Anatomically preprogrammed radiography). ARP improves the accuracy of controlling radiation exposure factors and the efficiency of the technologist's operations.

The Benito and Virden projects had not received final approval to proceed to construction by fiscal year-end.

A completely new hospital facility for Minnedosa is in the active planning stage.

EDUCATION

LABORATORY MEDICINE

Laboratory Medicine Education (LME) is administered and co-ordinated from the Cadham Provincial Laboratory for the entire Division by the Co-ordinator of LME.

Continued use was made of distant educational programs acquired from various sources. These programs may consist of a text, visual slides, audio-tapes, video-tapes or combination packs. Each program covers a specific topic related to laboratory medicine and may run up to one hour. The programs can be studied by individuals or in groups, at minimum cost to the Division, and at maximum convenience to the participants. During the year, 93 staff utilized these programs.

Dr. Williams, and invited specialists, continued the Division's on-site visitations. While at these visits, formal and informal presentations are delivered to rural physicians, technologists, auxillary staff and the public. Fifty-one such presentations were made on topics such as: Respiratory Infections, Manitoba Parasites, Lyme Disease, Hypothermia, Update on STD, Bacterial toxins and their clinical significance and Herpes VI. In all 470 individuals attended: 217 physicians, 91 technologists, and 162 others. The Division is highly appreciative of the contributions made by the visiting specialists.

Laboratory Assistantship Training

The Division continued to conduct a 12-week program to train selected Registered Radiological Technologists in basic laboratory medicine. In this program candidates receive five weeks intensive didactic training followed by seven weeks of guided practice in one of our rural Units. Six candidates graduated from this program. We are indebted to Donna Robbins and Pat Bird, who conducted a large part of the didactic program, and to the staff of the various Health Centres, who assisted us in the training of these students.

Inservice Training:

This area of training is categorized in six distinct formats:

1. Reviews on routine procedures by on-line staff, particulary to new staff and to summer students.

2. Introduction of new tests or instruments. This may involve:

   a. Familiarization by a sales representative or senior staff.
   b. A pre-test as a guide to basic relevant knowledge.
   c. Practice under supervision and guidance of an instructor.
   d. A practical test to demonstrate procedural competence.
   e. A post-test to demonstrate an understanding of principles, applications and pitfalls.

3. Lectures or seminars presented by senior staff or invited guests. These are usually broad topics of interest to all or several laboratory sections.

4. Presentation and review of current articles by designated staff members.

5. Short programs that are sent to individuals or groups, and that can be learned on-site without help from an instructor.

6. Formal programs that require indepth involvement and longer time commitments from both the participant and an instructor - e.g., re-training staff.

Specific activities under categories 2, 3, and 4 are listed below. The numbers in brackets represent the number of staff in attendance at the respective session. All were one hour each unless otherwise indicated:

CPL Seminars:

- Poetry in Motion: The Public Health Impact of Enteric Bacterial Infections - M.A. Karmali (90)

- Papillomavirus detection - Probe Progress - P. McNicol (31)

- The use of medical claim data to monitor the impact of influenza in Manitoba - L. Roos (43)

- Outreach Screening Activities - D. Gelskey/R. Thompson (26)

- Diagnostic Activities in Rural Manitoba - L. Baker/ D. Fotheringham (45)

- Perspectives from Insurance Industry on HIV Testing - B. Baxter (51)

- Surveillance Programs for Communicable Disease in Manitoba - L. Poffenroth (47)

- Human Papillomas - Oncogenic STD? - P. McNicol (43)

- Lyme Disease - L. Sekla/W. Stackiw/T. Williams (52)

- Serological Testing by E B-Virus - W. Stackiw (33)

- HIV Seroprevalence in Manitoba - G. Hammond/L. Sekla (49)

- Studies on the Diagnosis of Norwalk virus Gastroenteritis - G. Hammond (57)

- Issues in Cholesterol Screening in Manitoba - D. Gelskey (27)

Other CPL Sessions:

- Three Abbott Laboratories Teleconferences - 1 hour (72)

- Biohazard Seminar - 1.5 hours - A. Walbank (23)

- WHMIS - Seminar - 1.5 hours - A. Delaat (93)

- Two Basic Safety Seminars - 1.5 hours - A. Delaat (25)

- Evaluation of Influenza virus and its Relation to vaccine strain selection - 1 hour - A. Kendall (71)

- Public Health and Genetic Screening, J. C. Wilt - Honourary Lecturer - C. Scriver - 1 hour (86)

- Distinguished Visitors - Seminars and Discussions - - Professor Roy Anderson - London, England - 2 days

Rural Sessions:

- Basic Safety Seminar - 1 hour - Area Chiefs, etc. (18)

- Introduction to WHMIS - 1 hour - Area Chiefs, etc. (18)

- Transport of Dangerous Goods - 1 hour, Area Chief, etc. (18)

- Communications Skills Workshop, 3 hours, Gimli (7)

- Case Study Conferences, 0.5 hour/week, Hamiota (5)

- Identification and Morphology of Leukocytes, Correspondence - C.S.L.T. - 30 hours, Neepawa (4)

- EKG - Interpretation - 14 hours, Portage (4)

- EKG - Technique - 1 day, Portage (9)

- Human Sexuality - Athabasca U - correspondence 90 hours, Flin Flon (1)

- Clinical Chemistry - TMIT - correspondence 120 hours, Flin Flon (1)

- Aggasiz Academy Seminar - 1 hour, Portage (8)

- Cobas Mira Workshop - Brandon - 8 hours, Phyllis Gagne, Jane Holod

- Parklands Academy Lectures - Dauphin - 1 hour (9)

- Brandon Academy Lectures - 1 hour, Neepawa (17)

- Morphology of Leukocytes - C.S.L.T. - correspondence
  30 hours, Neepawa (4)

- Various Inservice Seminars - 6 hours, Swan River (13)
  - 11 hours, Lac du Bonnet (1)

- CPR - certification update - 1 hour, Swan River (11)

- Kodak DT - 60 Workshop - 8 hours, Killarney, Carman, Pine Falls (11)

- Red Blood cell Morphology - TMIT - correspondence
  - 120 hours, Pinawa (1)

- Hematology Update - SAIT - correspondence
  - 120 hours Pinawa (1)

- Pembina Valley Academy Lectures - 1 hour - various (27)

- Fire Safety - 1/2 hour, Selkirk (9)

- WHMIS Seminars - 3 hours - various locations (15)

- AIDS Seminars - 1 hour - various locations (17)

- CSLT - Management Courses - 30 hours/e, various locations (11)

- Microbiology Update - SAIT - correspondence
  - 120 hours, The Pas (1)

Extramural Training For The Division:

Several staff members received assistance to partake in extramural training programs, or supported themselves in such activities:

- Quality Control in the Nineties - Minneapolis (2 days)
  A. J. Norrie

- International Papillomavirus Workshop (4 days) France
  - P. McNicol (7 days) New Mexico

- Laboratory Safety Seminar - AOAC - Winnipeg (1/2 day)
  A. N. C. Delaat

- RSNA - Conference - Chicago - 5 days - L. Wilson

- Federal-Provincial Recreational Water Quality Working Group Meetings
  Vancouver - September 19 - 20, 1988, L. Sekla
  Toronto - February 2-3, 1989, L. Sekla

- Federal-Provincial AIDS Working Group Meeting:
  Calgary - November 25, 1989, L. Sekla

- 56th Conjoint meeting on Infectious Diseases
  Calgary, Alberta - Novembe 21-24, 1988, L. Sekla

- Immunochemistry Analyzer Workshop, 3 days
  Abbott Laboratories, Dallas, R. Thompson, January 1989

- National Neonatal Screening Symposium, Portland (4 days), J. G. Fox

- International Congress on Care of Terminally Ill,
  Montreal, C. L. Van Stone

- Certificate in Medical Sciences Courses - U of M,
  several staff members completed various courses

- MHO Conference - Winnipeg - 1 day - November 1988 (13)

- Brandon Postgraduate Course - 1 day - October 1988 (37)

- Monarch Chemistry Analyzer Workshop -2 days- Vancouver (1)

Extramural Teaching From The Division:

A number of our staff continued to contribute a significant amount of their time to teaching at the University of Manitoba Medical and Dental Faculties. These activities include lectures, seminars, tutorials, rounds and laboratory sessions in a variety of health-related programs.

Some entire courses are coordinated by Division staff:

Radiology 103.114 - Faculty of Dentistry and Radiology 70:212 - School of Dental Hygiene, Dr. D. Gelskey - Coordinator and Instructor.

Two graduate students were being supervised by our staff:
Mr. T. Scott-Taylor, M.Sc. student, by Dr. Hammond
Mrs. R. Kilani, Ph.D. student, by Dr. Sekla.

Several other post-graduate students, residents and fellows rotated through various departments of the CPL for varying periods of time:

Joel Kettner - Community Medicine
Peter Jessamine - Community Medicine Fellow - 2 months
Marie Louie - Infectious Disease Med. Micro Fellow
S. El Ghamdi, Michelle Alfa, Pam Orr, Donna Holton - 1 month each

Lab rounds are a weekly feature at the CPL, and review the medical use of diagnostic technology, specimen collection, and test interpretation. Twenty-one rounds were conducted at the CPL for infectious disease fellows, residents, interns and medical students. The rounds were presented by: Messrs. Stackiw, Klisko, Koschik, Ahluwalia, Barker, Milley and Kan, Drs. Maniar and McNicol, Mrs. Eibisch, Dzogan, Winther, Stockl, Bird, Giercke and Miss Pugh.

Some other activities of note:

- Ames Glucometer Workshop - Beausejour P.C.H. - March 1989

- Inservices to Nursing staff and/or patients were conducted at Beausejour[2] - Greg Prokopchuk, Morris[2], Wendy Bennet, Lac du Bonnet - Brenda Klassen, Selkirk[2], Denis Fitzpatrick, Carman, Wilma Peterson, Leaf Rapids[4], Mary Wright, Stonewall, Donna Raflant, Dauphin[10], Gail White, Treherne[3], Tamara Greenlay.

- Fotheringham, D., Black Box Technology - A panel discussion, Brandon Postgraduate Course, October 1988.

Hammond, G. W.:

- "GI Outbreak Pathogens - how they might spread in nursing homes, schools, hospitals, etc." - CHICA Seminar, St. Boniface Research Building, April 29, 1988.

- "Vaccines" - The Manitoba Pharmaceutical Association, Brandon, Manitoba, August 31, 1988.

- "Chancroid in Canada" - The British Columbia Medical Association Annual Convention, Vancouver, B.C., October 21, 1988.

- "Epidemiology of H. influenze Disease in Manitoba" - Workshop Hemophilus influenza Meningitis, Churchill, Manitoba, November 14-16, 1988.

- "The Challenges in Public Health Laboratory Medicine" - Provincial Laboratory, University of Alberta, Edmonton, Alberta, November 23, 1988.

- University of Toronto, Toronto General Hospital, Toronto, Ontario, January 17 and 18, 1989:

    - I.D.- Microbiology Rounds - "Influenza Infections", January 17, 1989

    - I.D.- Microbiology Research Seminar - "Norwalk Virus Gastroenteritis - New Insights into Diagnosis", January 17, 1989

    - Mount Sinai Hospital Grand Rounds - "Norwalk Virus Gastroenteritis - Revisited", January 18, 1989

- "AIDS Update" - 4th Year Medical Students, University of Manitoba, 1st session - February 14, 1989 (Second session to be held April 13, 1989).

McNicol, P.

- McNicol, P., F. Guijon, M. Paraskevas and R. Brunham. Comparison of filter in situ hybridization and cytology, colposcopy and histophatology for detection of human papillomavirus infection in women with uterine cervical dysplasia. 7th International Papillomavirus Workshop, Sophia Antipolis, France, May 16-20, 1988.

- McNicol, P. Human Papillomavirus and Genital Malignancy, Health Sciences Center, Winnipeg.

- McNicol, P., D. Wasylyshen and J. G. Dodd. Polymerase chain reaction amplification of HPV genomic sequences in the human prostate gland. 8th International Papillomavirus Workshop, Taos, New Mexico, USA. March 11-18, 1989.

- Guijon, F., P. McNicol, E. Heywood, M. Gray, and R. Brunham. Effect of menstrual cycle on detection of HPV in uterine cervical cells. 8th International Papillomavirus Workshop. Taos, New Mexico, USA. March 11-18, 1989.

- Guijon, F., P. McNicol, M. Paraskevas and R. Brunham. Detection of human papillomavirus in normal and dysplastic cervices. American Society for Colposcopy; Cervical Pathology and Gynecology Laser Society. San Franciso, California USA. April 18-21, 1988.

- Slimmon, E. Small Laboratory Management, Brandon Post-graduate Course, October 1988.

- Fifty Water and Waste students visited the CPL, focusing on Environmental Microbiology. Conveners were Mr. Stackiw, Mr. Milley, Ms. Pugh, and Mrs. Winzinowich, Feburary 1989.

- Visiting Allied Health Workers:

  - Phyllis Hirota - St. Amant Center - 1/2-day - September/88
  - Faith Mychasiw - RRCC Instructor - 1 week - April 1988
  - D. Saban, LRT - reinstatement training - Killarney - April 1989.

- Laboratory Acquired Infections - Mount Carmel Clinic, Winnipeg
  Delaat, A. N. C. September 1988
  WHMIS in the Workplace - Mount Carmel Clinic, Winnipeg
  Delaat, A. N. C. January 1989

  - Supply House Representatives, Winnipeg, January 1989

- Introduction to CPL: St. Boniface Hospital School of Med. Technology, Delaat, A. N. C.

- STD Training to Provincial and City of Winnipeg Public Health Nurses - several sessions - various staff participants

- U of Winnipeg Microbiology Class - April 1988

Sekla, Dr. L.:

- "Hepatitis B Vaccines". Mount Carmel - November 2, 1988.

- "An outbreak of Norwalk Gastoenteritis in a Winnipeg Hotel". Sekla, L., Stackiw, W., Dzogan, S., Sargeant, D. 56th Conjoint Meeting in Infectious Diseases, November 21-24, 1988, Calgary, Alberta.

- Lyme Disease in Manitoba, CPL Seminar, January 31, 1989.

- Serodiagnosis of HIV in Manitoba, CPL Seminar, February 21, 1989.

- Ethical and Occupational issues related to AIDS, MMA, February 9, 1989.

Abstracts Presented:

1. Maniar, A., Williams, T., Hammond, G. Detection of Vero-Toxin Director from Stool Specimens by Counter-Current Immuno Electrophoresis (CIE). Submitted to the ASM Annual Meeting, Miami Beach, Florida, May 8-13, 1988.

2. Hammond, G. and the Manitoba AIDS Virus Epidemiology Study (MAVES) Collaborative Group. Seroprevalence Survey of Risk Factor Assessment of HIV Infections in Manitoba. Presented at the IV International Conference on AIDS, Stockholm, Sweden, June 12-16, 1988.

3. Elmslie, K., Romanowski, B., Hankins, C., Rekart, M., Hammond, G., Fralick, R., Millson, E., Gemmill, I., O'Shaughnessy, M. Canadian Collaborative Study of Women Attending Sexually Transmitted Disease (STD) Clinics. Presented at the IV International Conference on AIDS, Stockholm, Sweden, June 12-16, 1988.

4. Aoki, F. Y., McIntyre, M. C., Buchanan, D. G., Poffenroth, L. A., Klikso, B. L., Campbell A. A., Hammond, G. W. Investigation and Control of an Outbreak of Viral Gastroenteritis in a Long-term Care Facility. Presented at the Annual Meeting of the Royal College of Physicians and Surgeons of Canada, September 25th-27th, 1988, Ottawa, Ontario.

5. Hammond, G., Klisko, B., Hazelton, P., Aoki, F., McIntyre, M., Poffenroth, L., Cubitt, D., Glass, R. Evidence of Norwalk-like Virus Gastroenteritis at an Outbreak at a Long-term Care Facility. Presented at the Annual Meeting of the Royal College of Physicians and Surgeons of Canada, September 25th-27th, 1988, Ottawa, Ontario.

Career Counselling:

- Stonewall Collegiate - A. N. C. Delaat, February 1989

- Manitoba School Science Symposium - P. Bird, A. N. C. Delaat
  April 1988

- McGregor Collegiate - D. Fotheringham

Competence Assurance Certificates - CSLT:

- Wendy Bennett, Morris
- Theresa Thevenot, Morris

RADIOLOGY

R.T. Training

The Manitoba Health Services Commission X-ray Training School continued its program of training candidates for registration with the Canadian Association of Medical Radiation Technologists. The program involves 25 months of X-ray training plus three months of Laboratory Assistant Training.

Five candidates passed the registration examination. Also, five senior students are progressing successfully through the clinical portion of the program in both rural and city hospitals.

Three junior students are currently enrolled in the theoretical portion of the program at Red River Community College, and are doing extremely well.

The program consists of two four-month blocks of theory at RRCC, separated by one month of clinical experience in a rural hospital. The final block of theory is followed by return to the rural hospitals for fifteen months of second year clinical training.

Although the training program is always faced with the problem of wide geographic distribution of the students during the second year clinical phase (Portage, Selkirk, Dauphin) that does not appear to interfere with the quality of the results of the program. In the fall of 1988, all the Radiography Training Programs in Manitoba experienced an Accreditration Survey by out-of-Province teams of radiologists and technologists. Our MHSC Program received full approval for the next five years without any recommendations for improvement.

In addition, at the 1988 graduation ceremonies, one of our 1987 graduates was awarded the prize for highest final examination marks in Manitoba.

X-ray Assistant Training

The Lab and X-ray Unit System sponsors selected Registered Medical Laboratory Technologists in a four month X-ray Assistant Training Program.

This course is designed to train individuals to assist Radiological Technologists in covering emergency call-back situations in smaller rural hospitals. Four students successfully completed the 1988 program.

Continuing Education

A number of in-service seminars, and workshops as well as extramural lectures and conferences were attended by Divisional staff.

The following topics were covered at the respective locations with the figures in brackets representing the number of individuals in attendance.

Radiography

Future Trends in Medical Diagnostics, Winnipeg - 1 hour	(2)
The Chest - 1 hour	(6)
C.T. of the Abdomen - 1 hour	(6)
Pediatric Genitourinary Tract - 1 hour	(6)
Pediatric Gastrointestinal Tract - 1 hour	(6)
Pediatric Respiratory Radiography - 1 hour	(6)
Pediatric Skeletal Radiography - 1 hour	(6)
Plain Films of Abdomen - 1 hour	(6)
Intravenous Urography - 1 hour	(6)
Introduction to Computers - 12 weeks	(2)
Organizational Effectiveness, Portage - 3 hours	(10)
Advances in Nuclear Medicine - 1 hour	(10)
Osteoporosis - 1 hour	(10)
Alzheimer's Disease - 1 hour	(10)
Magnetic Resonance Imaging - 1 hour	(10)
Introduction to Computers, Selkirk - 20 hours	(2)
Trauma Radiography - 1.5 hours	(6)
Positioning Refresher, Pinawa - 2 hours	(8)
Introduction to Computers - 12 weeks	(2)
Quality Assurance Tapes, Lac du Bonnet - 3 hours	(1)
Radiography of trauma A.V. Program - 4 hours	(1)
Introduction to Computers, Pine Falls - 12 weeks	(1)
Introduction to Computers, Carman/Gimli/Leaf Rapids - 12 weeks	(1)
A.V. Programs on several topics, chest, G.I. Tract, neuroadiography, etc., Morris - 5 hours	(3)
RSNA - several lecture topics and product evaluation on equipment - radiographic, ultrasound and mammography ultrasound, and mammography, Chicago - 5 days	(10)
CAMRT National Conference - several lecture topics, Vancouver - 5 days	(1)

In addition, several technologists are working on, or have completed, correspondence courses through their professional organization. The topics include: Pathology (3 sections), Quality Assurance (3 sections), Computers in Radiology, Cross-sectional Anatomy, Modern X-ray Equipment, the Effects of Radiation of Life and Polishing Your Written Communication.

Electrocardiography

Several technologists have pursued the self-study program and written the National certification examination.

Respiratory Distress Syndrome, Selkirk - 2 hours (1)

Extramural lectures - EKG technologist gave 20 hours of lectures to nursing staff on Interpretation of EKG's.

Electrocardiography, stress testing
Holter monitoring, Pinawa - 7 hours (2)

Winnipeg

Workshop sponsored by a commercial company attended by several technologists, Winnipeg - 6 hours

Ultrasound

Canadian Society of Diagnostic Medical Sonograhers - Continuing Medical Education Credits, Winnipeg

April 14-15, 1988	Many Topics	4.5 credit hours (5)
November 3-4, 1988	Many Topics	5.5 credit hours (5)
January 19-20, 1989	Many Topics	5.5 credit hours (5)

PUBLICATIONS

1. Ahluwalia, G. S., Hammond, G. W. Comparison of cell Culture and Three Enzyme-Linked Immunosorbent Assays for the Rapid Diagnosis of Respiratory Syncytial Virus from Nasopharyngeal Aspirate and Tracheal Secretion Specimens. Diagn. Microbiol. Infect. Dis. 9:187-192, 1988.

2. Delaat, A. N. C. Certificate in Medical Laboratory Sciences. Canad. J. Med. Technol., 51: 121-122, 1989.

3. Fox, J. G. Cholesterol and Coronary Heart Disease. Manitoba Medicine, 58: #2, 79-81, 1988.

4. Gelskey, D. E., Fox, J. G., and Hammond, G. W. Letters: Determining lipid risk factors for coronary heart disease. CMAJ, 140(5):493, 1989.

5. Hammond, G., Buchanan, D., Malazdrewicz, R., Conway, B., Tate, R., Sekla, L., Fast, M., Ronald, A. and the MAVES GROUP (1988). "Seroprevalence and demographic information of patients at risk for HIV infection in Manitoba, Canada". J. of Acquired Immune Deficiency Syndrome, Vol. 1, No. 2, 138-142.

6. Hammond, G. W., Rutherford, B., Malazdrewicz, R., MacFarlane, N., Pillay, N., Magian, V., Tate, R., Nicolle, L., Postl, B., Stiver H. G. Haemophilus influenzae meningitis in Manitoba and the Keewatin District, NWT: potenital for mass vaccination. CMAJ, 139: 743-747, 1988.

7. Hammond, G. W. "Chapter 21: Epidemiology, in Coxsackieviruses: A general update. Bendinelli, M., and Friedman, H., Plenum Press, 1988.

8. Hammond, G. W. Challenges in Diagnostic Medicine. Manitoba Medicine, 58(3):119-122, 1988.

9. Bureau of Communciable Disease Epidemiology, Laboratory Centre for Disease Control, Department of National Health and Welfare, Ottawa by the National Advisory Committee on Immunization* (*includes Dr. G. Hammond).

   - Statement on influenza vaccination for the 1988-89 season. CMAJ, 139(4):313-315, 1988 (reprinted from CDWR, Vol. 14-19, May 14, 1988).

   - Safety of immune globulin preparations. CMAJ, 139(6): 522, 1988 (reprinted from CDWR, Vol. 14-24, June 18, 1988).

10. Hammond, G. W. Editorial: Human immunodeficiency virus type 2. CMAJ, 140:121-122, 1989.

11. LaFrance, R., and Gelskey, D. E. A circuit modification that improves mammographic phototimer performance. Radiology, 166:773-776, 1988.

12. McNicol, P., F. Guijon, M. Paraskevas and R. Brunham. Comparison of filter in situ DNA hybridization with cytologic colposcopic and histopathologic examination for detection of human papillomavirus infection in women with cervical intraepithelial neoplasia. Am. J. Obstet. Gynecol. 16:265-270, 1989.

13. Sekla, L., Stackiw, W., Eibisch, G., Johnson, I. (1988). "An evaluation of measles serodiagnosis during an outbreak in a vaccinated community". J. Clinic. & Investigative Medicine II, 304-309.

14. Sekla, L, Hammond, G., Stackiw, W., Eibisch, G., Fast, M. "Testing pregnant women for HBsAg: A pilot study in Manitoba". CDWR, Vol. 14-31, 137-139.

15. Selin, L., Hammond, G. W., Aoki, F. Y. Neonatal herpes simplex virus infection in Manitoba, 1980-1986, and implications for preventive strategy. Ped. Infect. Dis. 7(10):733-734, 1988.

16. Thompson, R., Seargeant, L., and Winter, J. S. D. Screening for congenital adrenal hyperplasia. J. Pediatrics, In Press.

17. Whitley, R. J., Corey, L., Arvin, A., Lakeman, F. D., Sumaya, C. V., Wright, P. F., Dunkle, L. M., Steele, R. W., Soong, S.-J., Nahmias, A. J., Alford, C. A., Powell, D. W., San Joaquin, V., and the NIAID Collaborative Antiviral Study Group* (*includes Dr. G. Hammond). Changing Presentation of Herpes Simplex Virus Infection in Neonates. J. I. D. 158(1):109-116, 1988.

Table 1 Cadham Provincial Laboratory Workload Statistics 1987-89

	1987/88			1988/89		
SECTION	NO. OF SPECIMENS	NO. OF TESTS	STATISTICS CANADA UNITS	NO. OF SPECIMENS	NO. OF TESTS	STATISTICS CANADA UNITS
Clinical Microbiology	113,156	138,833	2,219,927	116,242	145,107	2,320,921
Media	N/A	N/A	331,366	N/A	N/A	361,906
Virus Detection	13,501	18,124	665,482	14,709	20,231	818,639
Environmental Microbiology	47,746	78,790	1,482,387	46,539	80,819	1,348,201
Serology/Parasitology	100,905	242,759	3,801,444	94,797	221,647	3,459,289
Metabolic/Chemistry	59,742	214,096	1,150,635	68,245	239,948	1,313,644
TOTALS	335,050	692,602	9,651,241	340,532	707,752	9,622,600

UNIT	EKG EXAMINATIONS TOTAL	IN/PAT	O/PAT	EKG WORK UNITS TOTAL	IN/PAT	O/PAT	LABORATORY WORK UNITS TOTAL	IN/PAT	O/PAT
RUSSELL	1,037	343	694	28,735	10,631	18,104	202,877	66,722	136,155
BIRTLE	738	303	435	20,908	9,462	11,446	132,106	44,166	87,940
ROSSBURN	526	69	457	14,260	2,338	11,922	89,852	21,081	68,771
SHOAL LAKE	483	181	302	13,940	5,914	8,026	96,025	29,474	66,551
DAUPHIN	6,879	2,926	3,953	195,028	87,013	108,015	1,118,810	387,094	731,716
GILBERT PLAINS	119	0	119	3,094	0	3,094	14,096	0	14,096
GRANDVIEW	385	114	271	10,848	3,660	7,188	106,262	26,155	80,107
MCCREARY	230	52	178	6,332	1,704	4,628	77,336	21,737	55,599
ROBLIN	1,880	901	979	53,448	27,842	25,606	305,541	102,656	202,885
STE. ROSE	1,110	423	687	31,044	12,622	18,422	319,293	144,677	174,616
WINNIPEGOSIS	383	228	155	10,580	6,510	4,070	66,193	32,741	33,452
NEEPAWA	2,444	1,006	1,438	69,812	31,160	38,652	416,363	146,844	269,519
CARBERRY	929	228	701	24,762	6,296	18,466	135,582	44,550	91,032
ERICKSON	425	148	277	11,914	4,480	7,434	73,056	26,824	46,232
GLADSTONE	444	139	305	11,992	4,022	7,970	133,172	40,417	92,755
MINNEDOSA	834	400	434	24,316	12,144	12,172	163,296	70,980	92,316
PORTAGE	3,438	1,148	2,290	98,759	33,965	64,794	874,537	309,412	565,125
MACGREGOR	179	17	162	4,686	458	4,228	19,478	1,268	18,210
M.D.C.	275	275	0	7,166	7,166	0	0	0	0
NOTRE DAME	231	118	113	6,050	3,268	2,782	81,654	24,399	57,255
ST. CLAUDE	270	88	182	7,260	2,528	4,732	48,963	18,312	30,651
TREHERNE	359	120	239	10,046	3,832	6,214	116,710	36,276	80,434
KILLARNEY	934	312	622	26,428	9,438	16,990	308,594	93,943	214,651
BALDUR	195	119	76	6,054	4,054	2,000	54,899	28,198	26,701
BOISSEVAIN	1,048	369	679	29,202	11,684	17,518	168,545	49,066	119,479
CARTWRIGHT	53	7	46	1,406	170	1,236	27,361	4,857	22,504
CRYSTAL CITY	546	253	293	16,094	8,548	7,546	194,838	63,720	131,118
DELORAINE	823	241	582	23,326	8,194	15,132	200,873	59,083	141,790
MELITA	523	252	271	15,348	8,424	6,924	121,022	40,187	80,835
MORDEN	1,783	581	1,202	47,996	18,778	29,218	536,944	143,204	393,740
ALTONA	649	188	461	20,048	6,930	13,118	220,617	66,465	154,152
CARMAN	1,119	528	591	31,999	16,336	15,663	252,834	99,903	152,931
EMERSON	278	78	200	7,852	2,652	5,200	62,414	20,021	42,393
MANITOU	264	125	139	7,282	3,486	3,796	61,313	15,264	46,049
MORRIS	864	386	478	26,812	13,932	12,880	216,213	84,736	131,477
SWAN LAKE	1,246	217	1,029	32,366	5,612	26,754	322,294	77,700	244,594
WINKLER	865	647	218	25,242	19,158	6,084	264,963	148,733	116,230
SELKIRK	2,497	1,089	1,408	73,539	32,682	40,857	621,286	174,515	446,771
BEAUSEJOUR	757	435	322	22,690	13,702	8,988	113,078	82,918	30,160
LAC DU BONNET	382	0	382	9,932	0	9,932	68,068	0	68,068
PINAWA	597	283	314	18,178	9,622	8,556	131,913	44,893	87,020
PINE FALLS	946	453	493	26,552	13,734	12,818	250,578	108,390	142,188
SELKIRK M.H.C.	258	258	0	7,634	7,634	0	13,269	13,269	0
WHITEMOUTH	192	85	107	4,992	2,210	2,782	19,471	10,055	9,416
SWAN RIVER	2,259	766	1,493	60,214	21,220	38,994	457,649	158,426	299,223
BENITO	96	31	65	2,496	806	1,690	9,431	5,167	4,264
GIMLI	1,621	582	1,039	48,162	19,340	28,822	269,335	70,393	198,942
ERIKSDALE	368	130	238	10,746	4,294	6,452	66,173	20,690	45,483
RIVERTON	133	0	133	3,954	0	3,954	0	0	0
STONEWALL	871	200	671	24,606	6,800	17,806	213,441	67,776	145,665
TEULON	754	303	451	21,588	9,862	11,726	200,595	60,419	140,176
VIRDEN	1,378	532	846	40,172	17,992	22,180	239,051	65,873	173,178
BRANDON M.H.C.	0	0	0	0	0	0	0	0	0
HAMIOTA	1,144	359	785	32,202	11,792	20,410	253,095	72,973	180,122
RESTON	413	124	289	11,890	4,168	7,722	61,854	20,266	41,588
RIVERS	396	53	343	10,800	1,714	9,086	119,851	26,629	93,222
SOURIS	1,470	399	1,071	38,937	13,626	25,311	226,184	68,892	157,292
ARBORG	413	220	193	12,786	7,542	5,244	118,418	43,743	74,675
ASHERN	359	115	244	9,334	2,600	6,734	88,643	23,496	65,147
CHURCHILL	384	167	217	10,724	5,058	5,666	413,120	143,127	269,993
FLIN FLON	2,561	651	1,910	74,792	22,134	52,658	594,857	227,823	367,034
GILLAM	118	46	72	3,484	1,768	1,716	68,695	11,673	57,022
GLENBORO	219	54	165	6,134	1,836	4,298	37,476	7,945	29,531
LEAF RAPIDS	113	22	91	2,931	778	2,153	71,727	7,493	64,234
LYNN LAKE	137	38	99	3,954	1,148	2,806	69,140	18,001	51,139
ST. PIERRE	695	439	256	19,270	12,614	6,656	119,086	48,786	70,300
STE. ANNE	742	383	359	19,736	10,356	9,380	156,234	72,194	84,040
SNOW LAKE	136	22	114	3,712	748	2,964	44,517	3,973	40,544
STEINBACH	2,366	742	1,624	69,068	25,220	43,848	404,919	128,927	275,992
SUNDANCE	0	0	0	0	0	0	0	0	0
THE PAS	3,012	1,238	1,774	99,469	40,716	58,753	1,003,235	464,161	539,074
VITA	382	99	283	10,620	3,262	7,358	100,782	25,068	75,714
WAWANESA	441	82	359	11,900	2,396	9,504	85,896	10,320	75,576

TOTAL EKG EXAMINATIONS =	63,398	IN/PAT =	23,930	OUT/PAT =	39,468
TOTAL EKG WORK UNITS =	1,809,633	IN/PAT =	743,785	OUT/PAT =	1,065,848
TOTAL LABORATORY WORK UNITS =	14,315,993	IN/PAT =	4,899,139	OUT/PAT =	9,416,854

Table 2 - LAXUS Workloads EKG and Laboratory

WORKLOAD OF RURAL LAB. & X-RAY UNITS SYSTEM - APRIL 1ST, 1988, TO MARCH 31ST, 1989

UNIT	X-RAY EXAMINATIONS TOTAL	IN/PAT	O/PAT	X-RAY S.C. UNITS TOTAL	IN/PAT	O/PAT	ULTRASOUND EXAMINATIONS TOTAL	IN/PAT	O/PAT
RUSSELL	3,695	553	3,142	124,503	25,179	99,324			
BIRTLE	1,779	436	1,343	57,007	16,915	40,092			
ROSSBURN	1,065	161	904	25,726	4,399	21,327			
SHOAL LAKE	1,443	261	1,182	34,766	6,672	28,094			
DAUPHIN	15,697	3,338	12,359	621,760	139,420	482,340	2,806	379	2,42
GILBERT PLAINS	391	0	391	8,497	0	8,497			
GRANDVIEW	1,196	234	962	29,454	7,343	22,111			
MCCREARY	742	107	635	18,871	3,095	15,776			
ROBLIN	2,743	742	2,001	74,061	24,238	49,823			
STE. ROSE	4,470	874	3,596	117,703	27,116	90,587			
WINNIPEGOSIS	860	320	540	19,341	7,088	12,253			
NEEPAWA	5,315	1,339	3,976	177,539	49,427	128,112			
CARBERRY	1,600	304	1,296	39,313	8,896	30,417			
ERICKSON	1,205	222	983	28,958	7,073	21,885			
GLADSTONE	1,718	324	1,394	51,733	10,942	40,791			
MINNEDOSA	2,718	514	2,204	97,648	20,770	76,878			
PORTAGE	11,643	2,297	9,346	410,728	81,101	329,627			
MACGREGOR	492	44	448	11,035	1,620	9,415			
M.D.C.	1,083	1,083	0	27,813	27,813	0			
NOTRE DAME	865	210	655	22,231	7,198	15,033			
ST. CLAUDE	585	162	423	14,725	5,475	9,250			
TREHERNE	1,200	204	996	44,882	8,929	35,953			
KILLARNEY	4,682	808	3,874	155,524	31,112	124,412			
BALDUR	478	177	301	13,258	6,632	6,626			
BOISSEVAIN	2,093	444	1,649	49,217	13,076	36,141			
CARTWRIGHT	246	23	223	5,362	645	4,717			
CRYSTAL CITY	1,612	392	1,220	43,402	10,851	32,551			
DELORAINE	2,347	351	1,996	66,562	11,681	54,881			
MELITA	1,786	425	1,361	45,188	14,219	30,969			
MORDEN	5,253	1,227	4,026	174,464	45,794	128,670			
ALTONA	2,483	410	2,073	82,674	13,946	68,728			
CARMAN	4,831	1,532	3,299	168,201	50,620	117,581			
EMERSON	769	175	594	17,229	3,858	13,371			
MANITOU	747	159	588	15,477	4,737	10,740			
MORRIS	2,445	513	1,932	68,084	16,137	51,947			
SWAN LAKE	3,471	447	3,024	124,759	20,961	103,798			
WINKLER	4,537	1,295	3,242	119,503	27,134	92,369	2,856	147	2,70
SELKIRK	11,354	1,405	9,949	371,569	43,263	322,306	2,439	144	2,29
BEAUSEJOUR	4,590	791	3,799	157,503	33,901	123,602			
LAC DU BONNET	1,105	0	1,105	24,977	0	24,977			
PINAWA	1,728	301	1,427	58,674	11,623	47,051			
PINE FALLS	2,956	728	2,228	76,044	18,781	57,263			
SELKIRK M.H.C.	874	874	0	25,549	25,549	0			
WHITEMOUTH	508	173	335	13,036	5,891	7,145			
SWAN RIVER	8,104	1,505	6,599	313,784	59,278	254,506	232	19	21
BENITO	184	50	134	6,445	1,765	4,680			
GIMLI	4,213	674	3,539	148,920	30,580	118,340			
ERIKSDALE	1,393	206	1,187	35,011	6,909	28,102			
RIVERTON	197	0	197	4,023	0	4,023			
STONEWALL	2,935	462	2,473	74,151	15,678	58,473			
TEULON	3,370	685	2,685	113,698	25,727	87,971			
VIRDEN	3,451	732	2,719	114,665	30,433	84,232			
BRANDON M.H.C.	264	247	17	5,662	5,305	357			
HAMIOTA	2,704	488	2,216	77,048	13,741	63,307			
RESTON	989	200	789	26,187	6,946	19,241			
RIVERS	941	145	796	22,163	3,648	18,515			
SOURIS	3,550	801	2,749	116,270	27,633	88,637			
ARBORG	2,070	368	1,702	46,981	11,755	35,226			
ASHERN	1,207	144	1,063	27,670	4,159	23,511			
CHURCHILL	1,862	460	1,402	65,087	13,864	51,223			
FLIN FLON	11,383	1,727	9,656	304,834	49,297	255,537			
GILLAM	958	89	869	22,361	3,070	19,291			
GLENBORO	466	76	390	11,236	2,610	8,626			
LEAF RAPIDS	935	48	887	26,630	1,730	24,900			
LYNN LAKE	1,311	157	1,154	39,189	5,969	33,220			
ST. PIERRE	3,044	751	2,293	105,718	30,916	74,802			
STE. ANNE	4,633	703	3,930	148,053	28,969	119,084			
SNOW LAKE	791	21	770	17,678	624	17,054			
STEINBACH	7,397	1,170	6,227	266,827	43,691	223,136	1,740	119	1,62
SUNDANCE	416	0	416	9,123	0	9,123			
THE PAS	17,141	2,728	14,413	546,535	89,198	457,337	2,483	326	2,15
VITA	1,324	216	1,108	30,841	6,106	24,735			
WAWANESA	1,003	142	861	23,333	4,144	19,189			

TOTAL X-RAY EXAMINATIONS =	211,636	IN/PAT =	41,374	OUT/PAT =	170,262	
TOTAL X-RAY S.C. UNITS =	6,684,673	IN/PAT =	1,430,865	OUT/PAT =	5,253,808	
TOTAL ULTRASOUND EXAMINATIONS =	12,556	IN/PAT =	1,134	OUT/PAT =	11,422	

Table 3 - LAXUS Workloads X-ray and Ultrasound

Table 4-1, Respiratory Isolates

A. RESPIRATORY	NUMBER OF ISOLATES		
	1986/87	1987/88	1988/89
C. diphtheria:			
gravis toxigenic	15	18	15
gravis non-toxigenic	5	5	31
mitis toxigenic	2	2	0
mitis non-toxigenic	27	42	45
B. pertussis	4	1	1
Acid Fast Bacilli			
positive culture	58	52	71
positive smears	10	23	37
Legionella:			
L. pneumophila	3	1	2

Table 4-2, Mycology Isolates

B. MYCOLOGY	NUMBER OF ISOLATES		
	1986/87	1987/89	1988/89
Presumptive Tinea versicolor	13	20	20
Candida albicans	1052	788	895
Dermatophytes	58	84	74
Blastomyces dermatidis		3	2

Table 4-3, STD Isolates

C. STD	NUMBER OF ISOLATES		
	1986/87	1987/88	1988/89
N. gonorrhoea	1583	1241	1044
C. trachomatis	5401	5984	5738
T. vaginalis	410	239	236

Table 4-4, Miscellaneous Isolates

D. MISCELLANEOUS	NUMBER OF ISOLATES		
	1986/87	1987/88	1988/89
C. difficile non-toxigenic	284	49	48
C. difficile toxigenic	324	53	99
Streptococcus Group A	1180	773	612
Streptococcus Group B	940	503	471
N. meningitidis	28	10	23
L. monocytogenes	0	0	3
H. ducreyi	0	1	1
C. difficile cytotoxin	324	277	331
Verotoxin			26

Table 4-5, Enteric Isolates

E. ENTERICS	NUMBER OF ISOLATES 1986/87	1987/88	1988/89
Escherichia Coli Group:			
08:K25	0	0	
026:K60	26	23	16
055:K59	30	23	17
086a:K61	15	3	3
0111:K58	13	21	14
0119:K69	1	1	6
0125:K70	19	11	5
0126:K71	30	15	19
0127a:K63	3	5	1
0128:K67	29	31	24
0124:K72	1	0	
018A018C:K77	1	3	
1057:H7	3	23	81
075:Non-motile	1	0	
Campylobacter fetus ss jejuni	160	147	137
Yersinia entercolitica	19	31	27
Aeromonas hydrophila	199	218	242
Plesiomonas shigelloides	13	6	15
Shigella:			
S. boydii 1 sero II	0	1	0
S. flexneri 1	1	8	9
S. flexneri 2	20	9	39
S. flexneri 6	13	3	4
S. flexneri X	0	0	0
S. sonnei	42	15	26
S. dysenteriae sero 1	1	0	0
S. dysenteriae sero 2	4	0	0
S. dysenteriae sero 3		1	0

E. ENTERICS (continued)	NUMBER OF ISOLATES 1986/87	1987/88	1988/89
Salmonellae:			
S. arizona	1	0	1
S. group B undifferentiated	0	4 (para B)	
S. agona	7	13	9
S. brandenburg	1	1	
S. heidelberg	15	50	20
S. minnesota	1	0	
S. saint paul	13	2	8
S. schwarzengrund	1	11	21
S. typhi	4	0	7
S. typhimurium	125	63	38
S. senftenberg	3	0	
S. infantis	12	13	13
S. montevideo	3	0	7
S. thompson	7	11	24
S. haardt	6	0	3
S. litchfield	2	1	1
S. muenchen	3	9	21
S. newport	13	6	9
S. enteriditis	16	67	30
S. havana	1	2	3
S. javiana	14	2	
S. albany	1	0	
S. nima	0	0	
S. hadar	97	93	94
S. poona	2	0	
S. panama	1	4	6
S. java	2	4	1
S. hvittingfoss	6	0	
S. new brunswick	0	2	
S. tennessee	1	0	
S. madelia	2	0	
S. manhattan	3	0	

E. ENTERICS (continued)	NUMBER OF ISOLATES 1986/87	1987/88	1988/89
Salmonellae: (continued)			
S. anatum	3	3	5
S. blockley	7	0	3
S. miami	1	2	1
S. ohio	2	14	2
S. typhimuirium copenhagen	1	0	
S. california		1	
S. cerro		1	
S. oranienburg		2	3
S. london		2	
S. braenderup		1	1
S. weltevreden		1	1
S. rissen		1	
S. nienstedten		3	
S. berta			
S. istanbul		1	
S. othmarschen		2	
S. uganda		1	
S. reading		3	
S. michigan		3	
S. kentucky			1
S. kottbus			4
S. bledagm			3
S. lomita	0	0	
S. virchow	3	0	1
S. stanley	1	5	7
S. johannesburg	4	0	
S. mbandaka	1	2	2
S. derby	2	2	10
S. untypable	1	2	
S. bovis morbificans	38	34	7
S. species	11	22	26
S. paratyphi A		3	1
S. paratyphi B	1	4	1

Table 4-6, Percentages of Organisms Resistant to Antibiotics (Selected)

	Ampicillin	Ticarcillin/ Pip.	Cloxacillin	Gentamicin	Tobramycin	Amikacin	Cefazolin/ Cephalothin	Cefoxitin	Cefotaxime	Co-trimoxazole	Nitrofurantoin	Tetracycline	Chloramphenicol	Clindamycin	Erythromycin	Vanomycin	Norfloxacin	Ceftazidime	Penicillin	No. Tested
Acinetobacter anitratus	70			0	0		100	85		13	100	30								40
Acinetobacter lwoffi	23	100		0	0		76	43		10	80	10								79
Aeromonas hydrophila	95	0		0	0	0	73	7	0	12		17	0							210
Citrobacter diversus	100			0			6	57		13	10	13								24
Citrobacter freundii	54			0			69	75		38	0	44								46
Enterobacter aerogenes	100			0			91	100		0	0	0								15
Enterobacter agglomerans	93			0			95	92		11	33	4								27
Enterobacter cloacae	96			<1			99	96		6	2	9					0			136
Escherichia coli	45	50		<1	0	0	5	<1	0	16	<1	27	9				0			2,464
Klebsiella ozaenae	83			0			12	0		75	0	17								12
Klebsiella oxytoca	98			0			33	0		7	0	10								99
Klebsiella pneumoniae	97	100		0	0	0	6	1.4	0	16	17	17	0							342
Morganella morganii	94			2			100	5		26	0	33								54
Moraxella sp.	9			0			4	0	0	40		0								22
Plesiomonas shigelloides	88			13			14			0	0	0								8
Proetus mirabilis	25			<1			6	1		8	26	99								327
Proetus vulgaris	100	52		7	1	50	100		0			50					10			22
Pseudomonas aeruginosa		52		7	1	50											10	0		277
Pseudomonas cepacia		69		88	83	79				3							5	0		41
Salmonella enteritidis	33			0			0			0										3
Salmonella hadar	5			0			5			0										22
Salmonella typhimurium	0			0			0			0										11
Serratia marcescens	94			0			100	50		13		94								47
Shigella flexneri	63			0			10	0	0	60			100							35
Shigella sonnei	100			0			5			11		100								20
Yersinia enterocolitica	100			20			100			25			0							5
Staphylococcus auerus			3	4			3			<1			0	2	15	0			93	1,859
Staphylococcus epidermidis			23	11			23			25			3	13	39	0			77	84
Staphylococcus saprophyticus			37	0			26			8				4	45				89	74
Streptococcus faecalis	2									0	2	68		67	87	0				574

Table 5-1, Number of Samples tested

	1987-88	1988-89
A. WATER - ROUTINE		
Membrane Filtration (MF)	38,326	39,189
Most Probable Number (MPN)	4,843	4,268
Standard Plate Counts (SPC)	20,948	21,664
B. FOOD		
Surveillance		
Food	417	246
Ice Cream	1,886	2,345
Outbreaks		
Food	214	200
Total	2,517	2,791

Table 5-2, Routine Testing, Membrane Filtration

	Total Coliform		Fecal Coliform	
Sample Source/Type	Total Number	Number Positive	Total Number of Samples	Number Positive
Raw	2672	26	65	0
Municipal	19514	329	1484	13
Well	4513	555	282	49
Lake	380	49	132	11
River	869	525	1091	349
Ice	61	0	1	0
Swimming Pool	2275	89	395	13
Water Mains	1018	20	96	11
Miscellaneous (Pumphouse, standpipe, spring, cistern, dugouts,, hydrants, reservoir, gravel pits)	1256	249	901	132
TOTAL	32558	1842	4447	578

Table 5-3, Routine Testing, Most Probable Number

	Total Coliform		Fecal Coliform	
Sample Source/Type	Total Number of Samples	Number Positive	Total Number of Samples	Number Positive
DRINKING				
Tap	1140	187	890	55
Well	340	95	272	30
Water Truck	114	26	97	12
Pumphouse	53	12	28	2
Standpipe	77	9	52	--
Bucket, Barrel	90	62	53	16
Lake	181	118	120	31
River	112	41	98	18
Miscellaneous	9	2	5	1
SUB-TOTAL	2116	552	1615	165
RECREATIONAL				
Lake	29	--	19	--
River	138	44	107	18
Miscellaneous (Dugouts, Ditch, Pond, Creek, Sewage)	250	84	196	31
	1735	699	1735	659
TOTAL	4268	1379	3672	873

Table 5-4, Pseudomonas aeruginosa detection

	Number Positive / Number Tested	
Source/Sample	1987 - 1988	1988 - 1989
Swimming Pools	7/121	0/74
Whirlpools	68/419	64/389
Others	10/51	24/95
	85/591	88/558

Table 5-5, Food Testing Results

	Number Positive / Number Tested	
Sample	1987 - 1988	1988 - 1989
Surveillance		
Food	166/417	79/246
Ice Cream	458/1886	677/2345
Outbreaks		
Food	75/214	15/200
TOTALS	699/2517	771/2791

Table 6-1, Diagnostic Chemistry Workloads

	NO. OF PATIENTS	NO. OF CONTROLS	NO. OF STANDARDS	NO. OF REPEATS	TOTAL NO. OF TESTS	UNIT VALUE	TOTAL UNITS
CHOLESTEROL (TOTAL)	4,512	766	1,058	259	6,595	4	26,380
HDL-CHOLESTEROL	2,248	522	493	39	3,302	5	16,510
TRIGLYCERIDES						3 IF NO CHOL. RUN ON SAME SPEC.	
	3,986	962	744	151	5,732	IF CHOL. IS RUN ON SAME SPEC.	5,732
IRON AND TIBC	386	108	25	4	523	15	7,845
THYROXINE (T4)	4,409	434	684	32	5,559	10	38,913
T3 UPTAKE	1,278	387	104	66	1,835	7	12,845
TSH	2,898	371	792	78	4,089	7	28,623
VIT. B12 AND FOLATE	734	210	424	66	1,434	7	10,038
DIGOXIN	1,067	555	188	106	1,916	4	7,664
THEOPHYLLINE	486	467	232	79	1,264	3	3,792
CHOLINESTERASE	170	43		51	264	3	792
GLYCATED HEMOGLOBIN	1,659	195		19	1,873	12	22,476
TOTALS	28,833	5,020	4,744	950	34,386		182,090

Table 6-2, Metabolic Screening Findings

	IDENTIFIED IN 1988 - 1989	TOTAL FROM 1965 TO MARCH 31, 1989
PKU	3	23
GALACTOSEMIA	-	5
GALACTOSEMIA VARIANTS	3	13
PROLINEMIA	-	3
HISTIDINEMIA	1	20
MAPLE SYRUP URINE DISEASE	-	2
TYROSINEMIA	-	2
HYPOTHYROIDISM	9*	38
TBG DEFICIENCY	-	2
CYSTINURIA	3	12
GLYCINEMIA	-	1
HARTNUP DISEASE	-	6
CONGENITAL ADRENAL HYPERPLASIA	1	1
TOTALS	20	128

* Includes one case of secondary hypothyroidism.

Table 7-1, Serology/Parasitology Overall Statistics - 1988-89

	NUMBER OF SPECIMENS	NUMBER OF TESTS	NUMBER OF UNITS	NUMBER OF SPECIMENS	NUMBER OF TESTS	NUMBER OF UNITS
SEROLOGY	90,554	224,458	3,155,391	84,978	213,869	3,051,124
R&D SEROLOGY	-	7,219	149,003	-	8,466	218,710
PARASITOLOGY	11,002	11,082	497,630	9,819	9,881	443,655
TOTAL	101,556	242,759	3,801,444	94,797	232,216	3,713,489

Table 7-2, Toxoplasma Diagnostic

1986-87			1987-88			1988-89		
Number Tested	Number Positive	Prenatal Positive	Number Tested	Number Positive	Number Prenatal Positive	Number Tested	Number Positve	Number Prenatal Positive
949	10	0	817	1	0	888	6	0

Table 7-3, Bacterial Serology

	Positive Level	1987-88 Number Tested	1987-88 Number Positive	1987-88 Positive Percent	1988-89 Number Tested	1988-89 Number Positive	1988-89 Positive Percent
Widal	1:50	42	4	9.5	34	3	8.8
Brucella abortus	≥1:160	186	13	7.0	271	6	2.2
Pasteurella tularensis	≥1:180	21	4	19.0	32	2	6.3

Table 7-4, Hepatitis Serology

	1987-1988			1988-1989		
	Number Tested	Number Positive	Percent Positive	Number Tested	Number Positive	Percent Positive
HbsAg*	8,949	535	6.0	8,119	523	6.4
Anti HBs	1,386	717	51.7	1,615	861	53.3
Anti HBc	311	68	21.8	961	140	14.6
HBeAg	282	107	38.0	375	169	45.0
Anti HBe	282	136	48.2	376	156	41.5
HAV IgG/IgM	37	21	56.8	74	44	59.5
HAV IgM	2,641	122	4.6	2,502	48	1.9
Anti HBcIgM	134	13	10.3	104	11	10.6
Anti Delta	16	-	-	23	1	4.3

*HBsAg diagnostic tests, i.e. excluding screening of prenatal sera which were included in previous years and were detailed in narrative sections.

Table 7-5, Respiratory Serology

A. Tests Done on Single Bloods	1986-1987		1987-1988		1988-1989	
	Number Tested	Number Positive	Number Tested	Number Positive	Number Tested	Number Positive
ASOT	2,063	435	1,618	309	1,529	229
ADB	156	19	179	24	234	27

B. Tests Done on Paired Bloods

	1987-1988					1988-1989				
	Number Tested	Seroconversion	Significant Change in Ab	High Static	Presence IgM	Number Tested	Seroconversion	Significant Change in Ab	High Static	Presence IgM
Mycoplasma pneumonia	2,199	4	4	21	72	2,653	3	1	10	8
Legionella spp.	1,241	3	-	2	10	1,041	1	1	1	3
Chlamydia spp.	265	-	-	-	3	393	3	2	3	8
Q Fever	109	-	-	-	-	99	-	-	2*	-
Adenovirus	1,217	3		-	12	1,189	5		-	6
RSV	1,103	2		-	4	993	13		-	1
Parainfluenza 1	968	-		1	-	690	-		-	-
Parainfluenza 2	969	-		-	-	690	-		-	-
Parainfluenza 3	969	-		-	-	693	3		-	6
Influenza A	1,228	14		-	12	1,136	56		-	7
Influenza B	1,061	34		-	1	1,076	20		-	7

*Low static titre to Phase II

Table 7-6, Syphilis Serology

	1986-87		1987-88		1988-89	
	Number of Specimens	Number Reactive	Number of Specimens	Number Reactive	Number of Specimens	Number Reactive
Blood	55,267	740	50,285	505	48,383	379
CSF	440	3	313	-	163	2
IFA	42	3	42	-	25	-

	1984-1985	1985-1986	1986-1987	1987-1988	1988-1989
No. Persons Reactive with Previous History	814	748	645	434	335
New Cases	86	69	43	7	5
New Cases in Registry	61	75	58	64	39

Table 7-7, Herpes Serology

	1987-1988				1988-1989			
	Number Tested	Sero-conversions	Significant Change in Ab	Number IgM Positive	Number Tested	Sero-conversions	Significant Change in Ab	Number IgM Positive
Herpes simplex	1,930	2	-	115	2,347	-	2	122
Herpes zoster	764	-	-	49	1,247	2	-	38
Cytomegalovirus	2,149	-	1	94	2,538	-	1	87
Epstein-Barr IgM	2,962	NA	NA	148	3,444	NA	NA	173

Table 7-8, Miscellaneous Virus Serology

	1987-88				1988-89			
	Number Tested	Sero-conversions	Significant Change in Ab	Number IgM Positive	Number Tested	Sero-conversions	Significant Change in Ab	Number IgM Positive
Measles	997	-	-	24	1,282	-	-	20
Mumps	565	-	-	17	750	-	1	15

	1987-88			1988-89		
	Number Tested	Sero-conversions	High Static Titre	Number Tested	Sero-conversions	High Static Titre
RMSF	13	-	-	67	1	-
Rotavirus	176	1	-	351	3	-

Table 7-9, Immune Status Serology

	1987-1988		1988-1989	
	Number Tested	Percent Susceptible %	Number Tested	Percent Susceptible %
Measles	107	13.1	51	13.7
Mumps	71	16.9	42	19.0
Diphtheria	171	13.5	176	29.5
Tetanus	172	10.5	174	9.2
Pertussis	84	6.0	73	15.1
Varicella/Zoster	2,096	4.8	1,175	5.7

Table 7-10, Rubella Serology

A. Total Number of Rubella Tests

	1987-1988	1988-1989
PHA Screening	28,728	26,134
IgM	691	679

B. Details of Prenatal Surveillance

	1987-1988			1988-1989		
Test	Number Tested	Susceptible	Percent	Tested	Susceptible	Percent
PHA	15,231	401	2.6	15,169	352	2.3

C. Details of Rubella Diagnostic Testing

	1987-1988			1988-1989		
Test	Number Tested	Number with IgM Present	Percent	Number Tested	Number with IgM Present	Percent
IgM	691	9	1.3	679	14	2.1

Table 7-11, Immunology-Serology

	Normal Values	1987-1988 Number Tested	1987-1988 Number with Significant Results	1988-1989 Number Tested	1988-1989 Number with Significant Results	
CRP	<5mg/L	103	34	124	36	
Rheumatoid factor	<1:24	2,105	124	1,594	141	
Antinuclear factor	<1:160	1,156	63	1,040	40	
Antimitochondrial	<1:40	54	4	30	6	
Anti Smooth Muscle	<1:40	35	4	15	2	
Anti-DNA	<1:20	146	5	126	6	
Anti-Parietal	<1:20	3	1	3	3	
Thyroglobulin antibody**	<1:160	369	37	73	6	
Microsomal antibody**	<1:160	369	67	73	20	
IgG	564-1765 mg/dl	N/A	N/A	41	3(H)*	3(L)*
IgM	45-250 mg/dl	N/A	N/A	36	-	2(L)*
IgA	85-385 mg/dl	N/A	N/A	33	4(H)*	2(L)*
C_3	70-180 mg/dl	N/A	N/A	77	3(H)*	2(L)*
C_4	163-44.7 mg/dl	N/A	N/A	78	2(H)*	10(L)*

**Both tests marked with ** must be elevated to be considered an autoimmune thyroid disease.

*H - Higher than normal values

*L - Lower than normal values

Table 8-1, Virus Isolations Compared

VIRUS ISOLATIONS	1987-1988 NO. OF DETECTIONS	1988-1989 NO. OF DETECTIONS
ADENONVIRUS		
Untyped Adenovirus	8	55
Adenovirus 1	29	25
Adenovirus 2	24	47
Adenovirus 3	11	19
Adenovirus 4		0
Adenovirus 5	8	5
Adenovirus 6	2	10
Adenovirus 7	3	5
Adenovirus 11		1
Adenovirus 31		2
Adenovirus 41A		13
COXSACKIE		
Coxsackie A9		5
Coxsackie B3		4
Coxsackie B4		10
Coxsackie B5		6
HERPES		
Varicella zoster	17	20
Cytomegalovirus	123	86
Herpes simplex	1,571	1,503
Herpes simplex 01	1	93
Herpes simplex 02	2	6
Herpes virus (by E.M.)	18	11
ECHOVIRUS		
Echovirus		
Echovirus 5		1
Echovirus 7	9	
Echovirus 9	10	6
Echovirus 11	3	3
Echovirus 14	6	
Echovirus 17	4	
Echovirus 18		3
Echovirus 21	4	
Echovirus 22	6	5
CORONAVIRUS	9	2

cont.

Table 8-1, cont

VIRUS ISOLATIONS (Cont'd)	1987-1988 NO. OF DETECTIONS	1988-1989 NO. OF DETECTIONS
INFLUENZA		
Influenza A	4	62
Influenza B	12	5
PARAINFLUENZA		
Parainfluenza 01		1
Parainfluenza 02	1	1
Parainfluenza 03	13	18
POLIOVIRUS		
Poliovirus 01	4	1
Poliovirus 02	3	4
Poliovirus 03	3	1
ENTEROVIRUS (Not typed)	148	212
MOLLUSCUM CONTAGIOSUM		5
ROTAVIRUS	214	230
RESPIRATORY SYNCYTIAL VIRUS	75	166
REOVIRUS		
Reovirus 01		1
Reovirus 02	4	0
Reovirus 03		3
PAPILLOMAVIRUS		
Papillomavirus 06		488
Papillomavirus 11		497
Papillomavirus 16		398
Papillomavirus 18		397
RHINOVIRUS		5
UNIDENTIFIED VIRUS		22